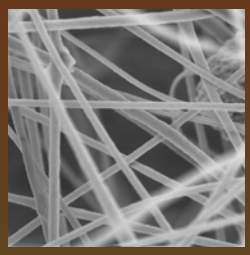
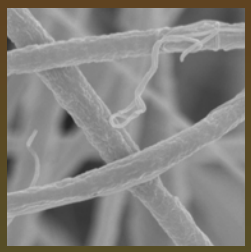
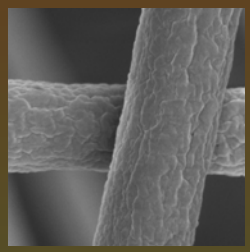
# NanoSights

## 2024
ANNUAL MAGAZINE







UNIVERSITI PUTRA MALAYSIA
BERILMU BERBAKTI

Institute of Nanoscience and Nanotechnology

# PREFACE

Welcome to the inaugural edition of NanoSights, a refreshed identity for our annual magazine, formerly known as NanoScope.

This rebranding represents more than just a name change. NanoSights is a reflection of how we continue to evolve, adapt, and sharpen our focus as a leading research institute. It is a celebration of the stories, people, and moments that make our community unique.

In these pages, we bring together colourful stories from the year: academic progress, events, collaborations, and personal milestones, woven together to reflect the energy and spirit of our institute. As always, this publication is the result of a collective effort, and I would like to thank everyone who contributed to its making.

We hope you enjoy NanoSights as much as we enjoyed creating it. Here's to looking back with pride and forward with purpose.

*By the Chief-in-Editor*

Assoc. Prof. Ir. Ts. Dr. Siti Hajar Othman

# CONTENT



# EDITORIAL BOARD



**COVER:**
Image obtained using Field Emission Scanning Electron Microscope (FESEM)
Sample: Graphite Electrospun Nanofiber
Source: Mohd Ali Mat Nong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# A MESSAGE FROM THE DIRECTOR

Bismillahirrahmanirrahim.

I am delighted to share this message in the first edition of NanoSights, our newly rebranded annual magazine. It is both a privilege and a milestone, as this also signifies my first year serving as the Director of the Institute of Nanoscience and Nanotechnology (ION2), UPM.

Reflecting on 2024, we celebrate our achievements and the resilience that carried us through. Our focus on the University-Driven Research Programme (UDRP) in 'Nanomaterials and Nanotechnology' is a deliberate stride toward advancing the field in alignment with UPM's 'True North' framework. As a promising start, we secured a total of RM2.8 million in research grants; an impressive milestone that reflects the dedication, perseverance, and innovative spirit of our research community.

This year, we also strengthened our partnerships and broadened our impact. In collaboration with the National Nanotechnology Centre (NNC), MOSTI, we successfully organised iSAMN2024 and engaged with the community through *NanoDidik* and *Kem Nanosains*, bringing nanoscience and nanotechnology closer to the community.

Most significantly, 2024 marked the 25th anniversary of ION2, our Silver Jubilee. In celebration of this important milestone, we were honoured to sign a Memorandum of Agreement (MoA) with the Mahmood and Ragayah Foundation. This agreement includes a growth endowment of RM5 million, laying a strong foundation for impactful initiatives that support our research pursuits and nation-building. It reflects the generosity of our partners and also the trust placed in ION2's vision for the future.

As we move forward, we do so with renewed commitment to strengthening our research, supporting our community, and rising above challenges. I thank all our staff, collaborators, and partners for their unwavering support throughout the year.

Together, we will continue to shine.

**Prof. Ir. Ts. Dr. Suraya Abdul Rashid**

## ION2 2024 KEY INSIGHTS

### FINANCIAL SUPPORT

**RM2.83 Million** Research grants

**RM5 Million** Growth endowment

**RM7.2 Million** High-end equipment

### OUR TEAM

**10** Professors from multiple fields of research (including associate researchers)

**40** Outstanding researchers

### RESEARCH INSIGHTS

**99** Q1 & Q2 journals

**152** Scopus-indexed journals

**13** Book & chapter in book

### GRADUATE MILESTONES

**5** Master's graduates

**6** PhD graduates

### COLLABORATIVE NETWORK

**18** Active MoU/MoA to date

# OVERVIEW

The Institute of Nanoscience and Nanotechnology (ION2), formerly known as the Institute of Advanced Technology (ITMA), was established in 1999 to drive research in physical sciences, information technology, and engineering. In 2021, recognising the transformative potential of nanotechnology and advanced materials, ITMA was rebranded as ION2, focusing on nano-scale green synthesis and applications.

ION2 is dedicated to sustainable research aligned with Industrial Revolution 5.0 (IR5.0), Society 5.0, the 17 Sustainable Development Goals (SDGs), and Malaysia's MySTIE 10–10 framework. Our researchers have successfully commercialised innovations through Putra Science Park's Innohub program, supporting UPM's vision of fostering technopreneurs.

Beyond research and development, ION2 nurtures future research leaders through postgraduate programs, industry collaborations, accredited testing services, and knowledge-sharing platforms.

## MISSION

To contribute significantly towards wealth creation, nation-building, and universal human development through high-impact research in nanotechnology and advanced materials.

## VISION

To become a research institute of international repute in the field of nanotechnology and advanced materials.

## GOALS

- To empower the institute as a premier centre of excellence by providing the best research infrastructures.
- To elevate scientific achievements in research and innovation to international levels.
- To produce knowledgeable and competitive graduates.
- To strengthen involvement of relevant industry and community towards wealth creation and knowledge sharing.
- To strengthen institutional governance, financial and green practices sustainability

## The ecosystem

# ACHIEVEMENTS

## AND AWARDS

This section showcases the institute's dedication to research excellence, highlighted by successful funding, high-impact publications, and outstanding researcher achievements. Through groundbreaking discoveries and innovation, the institute continues to push the boundaries of nanoscience and nanotechnology.

**RESEARCH GRANTS**

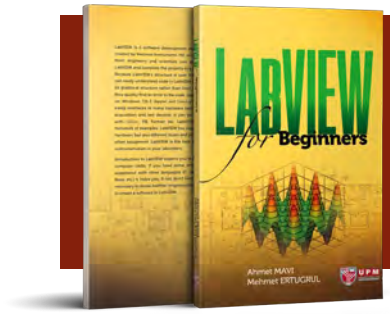
In 2024, total annual research funding hit a 5-year high, reaching

**RM2,834,486.00**

| Project title | Details |
|---|---|
| Supercapattery as Smart Advanced Energy Storage Utilizing Porous Coordination Polymer-based Hybrid Composites as Electrode Materials | Amount: RM 777,940.00<br>Funder: CREST<br>Researcher: Assoc. Prof. Dr. Yusran Sulaiman |
| Composite Supercapacitor Devices Produced by Sputtered and/or Loaded 2D InSe, GaSe and $MoS_2$ Layered Structures on Graphenated CNT-cotton | Amount: RM 542,757.92<br>Funder: Might-Tubitak<br>Researcher: Dr. Ismayadi Ismail |
| Exploring Sustainable Zn-MOF/Carbon Composite Alginate Aerogels for $CO_2$ Electrochemical Reduction: A Preliminary Study | Amount: RM 28,270.00<br>Funder: Royal Society of Chemistry<br>Researcher: Assoc. Prof. Dr. Shahrul Ainliah Alang Ahmad |
| Waste Cooking Oil-Based Green EMI Shielding: Synthesis and Performance at X-Band Frequencies | Amount: RM 30,000.00<br>Funder: Ministry of Higher Education<br>Researcher: Dr. Ismayadi Ismail |
| Synergistic Effect Of Metal-organic Framework (MOF) - Derived Transition Metal Oxides/Graphene For Supercapattery Devices | Amount: RM 100,000.00<br>Funder: UPM<br>Researcher: Assoc. Prof. Dr. Yusran Sulaiman |
| Production of Nano Magnetized Activated Carbon from Bamboo (Dendracalum Asper) Using 2-in-1 Carbonization Activation Reactor for Phenol Removal | Amount: RM 20,000.00<br>Funder: UPM<br>Researcher: Dr. Mohamad Faizal Ibrahim |
| Elucidation on the Kinetics and Mechanism of Self-Healing Bionanocomposite Films | Amount: RM 155,800.00<br>Funder: Ministry of Higher Education<br>Researcher: Assoc. Prof. Ir. Ts. Dr. Siti Hajar Othman |
| Elucidating Correlations Between Flames, Catalytic Combustion and HCl Emissions of an Innovative $KMnO_4$/AP Dual-oxidizer Propellant | Amount: RM 162,700.00<br>Funder: Ministry of Higher Education<br>Researcher: Assoc. Prof. Dr. Norkhairunnisa Mazlan |
| An Explainable AI-Driven Mobile App for Rapid TB Testing (RTB-TEST) | Amount: RM 12,000.00<br>Funder: UPM<br>Researcher: Prof. ChM Dr. Nor Azah Yusof |
| Carbon Quantum Dots Synthesis from Oil Palm Trunks Charcoal Fusing Microwave Digester | Amount: RM 8,000.00<br>Funder: UPM<br>Researcher: Dr. Nurul Huda Osman |

CREST: *Collaborative Research in Engineering, Science and Technology*

| Project title | Details |
|---|---|
| Fabrication of Hierarchical Porous ZIF-8/Carbon Aerogel Composites for Electrochemical Sensing of Imidacloprid in Water Samples | Amount: RM 6,000.00<br>Funder: UPM<br>Researcher: Assoc. Prof. Dr. Shahrul Ainliah Alang Ahmad |
| Novel Carbon Dots for Potential Sensing Application | Amount: RM 20,000.00<br>Funder: UPM<br>Researcher: Assoc. Prof. Dr. Yap Wing Fen |
| Commercialization of Graphenated Carbon Nanotubes (GCNT) for High-Performance Energy Storage and Conductive Materials | Amount: RM 83,614.00<br>Funder: UPM<br>Researcher: Dr. Ismayadi Ismail |
| Production of Electrode Materials for Energy Storage Devices | Amount: RM 95,000.00<br>Funder: UPM<br>Researcher: Prof. Dr. Lim Hong Ngee |
| An Explainable AI-Driven Mobile App for Rapid TB Testing (RTB-Test) | Amount: RM 245,000.00<br>Funder: CREST<br>Researcher: Prof. ChM Dr. Nor Azah Yusof |
| Unveiling 17α-ethinylestradiol (EE2): An Aptasensor for Safeguarding Drinking Water | Amount: RM 247,405.00<br>Funder: CREST<br>Researcher: Prof. Dr. Mohd Adzir Mahdi |
| Synthesis and Characterization of Silicon Nanowires for Advanced Battery Applications | Amount: RM 100,000.00<br>Funder: UPM<br>Researcher: Prof. Dr. Lim Hong Ngee |
| Enhancing Sensitivity and Selectivity of Surface Plasmon Resonance using Biomass Waste-derived Carbon Dots Nanocomposites for Potential Detecion of Endocrine Disrupting Compounds | Amount: RM 100,000.00<br>Funder: UPM<br>Researcher: Assoc. Prof. Dr. Yap Wing Fen |
| Fish Feed Formulation of Ganoderma Lucidum Fermented-oil Palm Decanter Cake Enriched with Insect Protein from Black Soldier Fly Larvae and Nano-minerals Premix for Tilapia | Amount: RM 100,000.00<br>Funder: UPM<br>Researcher: Dr. Mohamad Faizal Ibrahim |




## PUBLICATIONS

ION2 researchers published 152 Scopus-indexed journal articles in 2024, with 64.2% appearing in top-tier Q1 and Q2 journals! In addition, they contributed 12 book chapters and successfully launched a research book published by Penerbit UPM.

| Key Performance Index (KPI) | Achievements |
|---|---|
| Publications in CIJ | 152 |
| Publications in Q1 & Q2 Journals | 99 (64.2%) |
| Research Book | 1 |
| Chapter in Research Books | 12 |
| Other Publications | 15 |

12 ION2 researchers have been listed as

# World's TOP 2% Scientists

for Citation Impact in a Single Year (2024) by Stanford University

Ts. Dr. Umer Rashid
(2,005 citations)

Prof. ChM
Dr. Lim Hong Ngee
(1,661 citations)

Assoc. Prof.
Dr. Khamirul Amin Matori
(1,195 citations)

Prof. Dr. Mohd Adzir Mahdi
(1,190 citations)

Dr. Mohd Hafiz
Mohd Zaid
(1,181 citations)

Prof. Ir. Ts.
Dr. Suraya Abdul Rashid
(1,041 citations)

Prof. ChM
Dr. Zulkarnain Zainal
(952 citations)

Prof. ChM
Dr. Nor Azah Yusof
(911 citations)

Assoc. Prof. Ir. Ts.
Dr. Siti Hajar Othman
(694 citations)

Assoc. Prof. Dr. Mohamad
Amran Mohd Salleh
(690 citations)

Assoc. Prof.
Dr. Abdul Halim Abdullah
(639 citations)

Assoc. Prof.
Dr. Yap Wing Fen
(617 citations)

# Congratulations

## Malaysian Technology Expo (MTE 2024)


**Ts. Dr. Mohd Hafizuddin Ab Ghani** won the Technical and Vocational Training Corporation **Special Innovation Award** from the Government of Saudi Arabia and **a silver medal** at the Malaysian Technology Expo **(MTE 2024)** through his research project, "PATES: PLA-Tapioca Eco-Friendly Solutions."



## ION2 Excellent Researcher Award 2023

Outstanding Researcher
**Prof. Dr. Janet Lim Hong Ngee**

Outstanding Interim Researcher
**Dr. Josephine Liew Ying Chyi**


## Defense Security & Sustainability 2024

**Dr. Ismayadi Ismail** was awarded the prestigious **Best Award (Science & Technology)** category at the **Defense Security and Sustainability (DSS)** 2024, held on 25 April at Zulfaqar Hall, Universiti Pertahanan Nasional Malaysia (UPNM). His groundbreaking project, "Innovations in Electro-magnetic Defense: Unveiling Advanced Microwave Absorption Technologies," earned him this well-deserved recognition.

# Surface Plasmon Resonance Sensor for the Detection of Environmental Pollutants

Assoc. Prof. Dr. Yap Wing Fen (FNDL)
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With growing concerns about environmental pollution, the development of advanced sensing technologies for real-time and sensitive pollutant detection has become more crucial. Surface plasmon resonance (SPR) sensor has emerged as a versatile platform for monitoring environmental pollutants due to their label-free detection capabilities, high sensitivity, and real-time monitoring potential [1].

Various approaches have been developed to generate SPR, including grating-coupled systems, optical fiber systems, and prism-coupled systems. Among these, prism-based SPR is the most widely used due to its high sensitivity and ease of operation. The Kretschmann configuration, illustrated in Fig. 1, is the most common setup for prism-based SPR sensors. In this configuration, monochromatic and p-polarized light is directed onto a thin metal film to excite surface plasmons, which are resonant oscillations of free electrons at the interface between the metal and a dielectric material. At a specific angle, known as the resonance angle, the momentum of the surface plasmon wave matches that of the incident light, resulting in a reduction in the intensity of reflected light due to resonance [2].

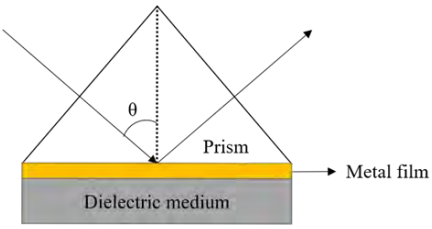


*Fig. 1. Kretschmann configuration of prism-based SPR.*

SPR is highly sensitive to changes in the refractive index near the metal surface, as any variation in refractive index causes a shift in the resonance angle. However, one limitation of SPR sensor is its reduced sensitivity towards low concentrations of target analytes. To address this challenge, SPR sensor has been incorporated with various sensing materials to enhance its sensitivity and improve detection performance for specific analytes. This integration enables SPR sensor to detect trace amounts of pollutants, including heavy metal ions, phenolic compounds, and pesticides, making them an essential tool for environmental monitoring. Fig. 2 shows the schematic of SPR experimental setup integrating various sensor films for the detection of different environmental pollutants.

Our research group has made significant efforts in detecting various environmental pollutants. Focusing on heavy metal ions detection, incorporating SPR with nanocrystalline cellulose/ graphene oxide/ copper ionophore enables the detection of copper ion at concentrations ranging from 0.001 to 0.1 ppm, as shown in Fig. 3. This integration allows for copper ion sensing at concentrations as low as 0.001 ppm, with excellent selectivity for the pollutant [3].

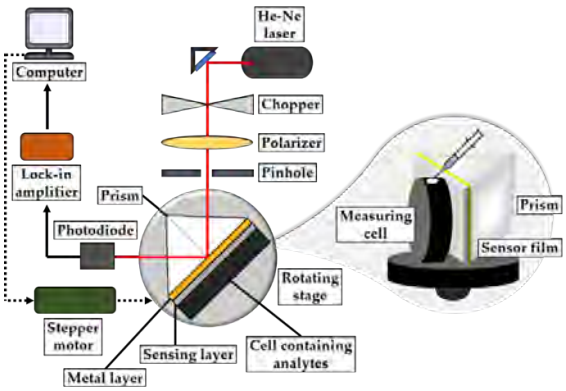


*Fig. 2. Schematic of SPR experimental setup.*

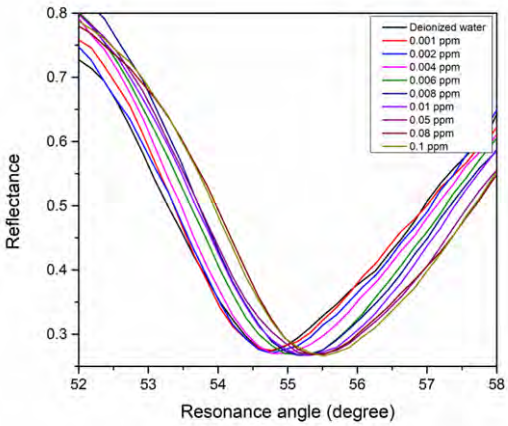


*Fig. 3. SPR reflectivity curves of nanocrystalline cellulose/graphene oxide/copper ionophore thin film for the detection of various concentrations of copper ion from 0.001 to 0.1 ppm.*

Similarly, a detection limit of 0.001 ppm was achieved for ferric ion using cetyl-trimethylammonium bromide/ hydroxylated graphene quantum dots as the sensor film [4]. For mercury ion detection, SPR sensor integrated with nanocrystalline cellulose/ poly (3,4-ethylenedioxythiophene) achieved an impressive detection limit of 2 ppb [5]. Additionally, cobalt ion was detected at a limit of 0.01 ppm when chitosan-graphene oxide/cadmium sulfide quantum dots were used as the sensing material [6].

As for phenolic compounds, SPR sensor integrating graphene oxide/tyrosinase and graphene quantum dots achieved detection limits of 1 µM and 0.1 µM, respectively, for phenol sensing [7,8]. For pesticide detection, carbaryl was detected at remarkably low concentrations of 0.02 ppb and 0.001 ppb using graphene oxide/polyvinyl alcohol and graphene quantum dots/polyvinyl alcohol as the active layers in SPR sensor, respectively [9,10].

***References***


***[1]*** *Y. Yanase, K. Yoshizaki, K. Kimura, T. Kawaguchi, M. Hide, S. Uno, Development of SPR imaging-impedance sensor for multi-parametric living cell analysis, Sensors 19 (2019) 2067.*

***[2]*** *W.M.E.M.M. Daniyal, Y.W. Fen, N.I.M. Fauzi, H.S. Hashim, N.S.M. Ramdzan, N.A.S. Omar, Recent advances in surface plasmon resonance optical sensors for potential application in environmental monitoring, Sensors Mater. 32 (2020) 4191.*

***[3]*** *W.M.E.M.M. Daniyal, Y.W. Fen, J. Abdullah, A.A.A. Bakar, M.A. Mahdi, Sensitive and selective Cu2+ detection via surface plasmon resonance using ionophore decorated nanocrystalline cellulose-graphene oxide thin film, Sensors Actuators A Phys. 366 (2024) 114847.*

***[4]*** *N.A.A. Anas, Y.W. Fen, N.A. Yusof, N.A.S. Omar, W.M.E.M.M. Daniyal, N.S.M. Ramdzan, Highly sensitive surface plasmon resonance optical detection of ferric ion using CTAB/hydroxylated graphene quantum dots thin film, J. Appl. Phys. 128 (2020) 083105.*

***[5]*** *N.S.M. Ramdzan, Y.W. Fen, N.A.S. Omar, N.A.A. Anas, J.Y.C. Liew, W.M.E.M.M. Daniyal, H.S. Hashim, Detection of mercury ion using surface plasmon resonance spectroscopy based on nanocrystalline cellulose/poly(3,4-ethylenedioxythiophene) thin film, Measurement 182 (2021) 109728.*

***[6]*** *S. Saleviter, Y.W. Fen, W.M.E.M.M. Daniyal, J. Abdullah, A.R. Sadrolhosseini, N.A.S. Omar, Design and analysis of surface plasmon resonance optical sensor for determining cobalt ion based on chitosan-graphene oxide decorated quantum dots-modified gold active layer, Opt. Express 27 (2019) 32294.*

***[7]*** *H.S. Hashim, Y.W. Fen, N.A.S. Omar, J. Abdullah, W.M.E.M.M. Daniyal, S. Saleviter, Detection of phenol by incorporation of gold modified-enzyme based graphene oxide thin film with surface plasmon resonance technique, Opt. Express 28 (2020) 9738–9752.*

***[8]*** *H.S. Hashim, Y.W. Fen, N.A.S. Omar, W.M.E.M.M. Daniyal, N.I.M. Fauzi, J. Abdullah, M.A. Mahdi, Surface plasmon resonance sensor based on gold-graphene quantum dots thin film as a sensing nanomatrix for phenol detection, Opt. Laser Technol. 168 (2024) 109816.*

***[9]*** *N.I.M. Fauzi, Y.W. Fen, J. Abdullah, M.A. Kamarudin, N.A.S. Omar, F.B.K. Eddin, N.S.M. Ramdzan, W.M.E.M.M. Daniyal, Evaluation of structural and optical properties of graphene oxide-polyvinyl alcohol thin film and its potential for pesticide detection using an optical method, Photonics 9 (2022) 300.*

***[10]*** *N.I.M. Fauzi, Y.W. Fen, F.B.K. Eddin, W.M.E.M.M. Daniyal, Structural and optical properties of graphene quantum dots-polyvinyl alcohol composite thin film and its potential in plasmonic sensing of carbaryl, Nanomaterials 12 (2022) 4105.*

# Hydroxyapatite-Enriched Clay Composite (CHAp) as an Advanced Microbial Carrier for Bioenergy Production

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With the growing demand for sustainable bioenergy, innovative microbial carriers are essential to enhance process efficiency. Hydroxyapatite (HAp), a calcium phosphate-based nanomaterial, has gained significant attention due to its exceptional biocompatibility, high surface area, porosity, and ion-exchange capacity. The integration of HAp into Clay-Hydroxyapatite (CHAp) composite offers a novel solution to improve microbial retention, biofilm formation, and overall process stability in biomethane systems. In the presence of HA, Ca, and P were predominantly localized on the bacterial surface within the scanned area, indicating that HA was attached to the anaerobic bacteria [1].

The high porosity and bioactivity of HAp ($Ca_{10}(PO_4)_6(OH)_2$) facilitate strong microbial adhesion, which is critical for immobilization-based bioprocesses as it facilitates ion exchange and buffering by releasing $Ca^{2+}$ ions that aid microbial metabolism and pH stability. The Ca/P ratio (1.67) in natural and synthetic HAp provides a stable and chemically favorable surface for microbial attachment and growth. The CHAp composite, formulated by integrating HAp with bentonite clay and granular activated carbon (GAC), enhances the performance of anaerobic digesters and sequencing batch reactors (SBRs).

Clay and pumice were selected as binding materials for HAp due to their natural abundance, non-toxic nature, and excellent adsorption properties [2]. The GAC enhances the mechanical and chemical stability of biofilm formation, prolonging its industrial lifespan during long-term hydrogen production in reactors [3]. Additionally, each synthesis method influences the core and shell characteristics, such as size, shape, and surface properties. As a result, the composite's functionality can be tailored, expanding its range of potential applications [4].

A study evaluating different CHAp formulations revealed that CHAp-$R_3$, containing an optimized ratio of HAp (15.5%), bentonite (16.5%), GAC (2%), and iron powder (5%), demonstrated superior biomethane production efficiency. The results showed a methane production rate of 15.9 mmol $CH_4$/L.d, 300 mL/L.d which is 25% higher than the control, along with a methane yield of 8.32 mol $CH_4$/mol TC and a total cumulative biogas production of 7120 mL (Fig. 1). The key advantages of HAp in CHAp composites include its ability to enhance biofilm formation by providing a high-surface area structure for microbial attachment [5].

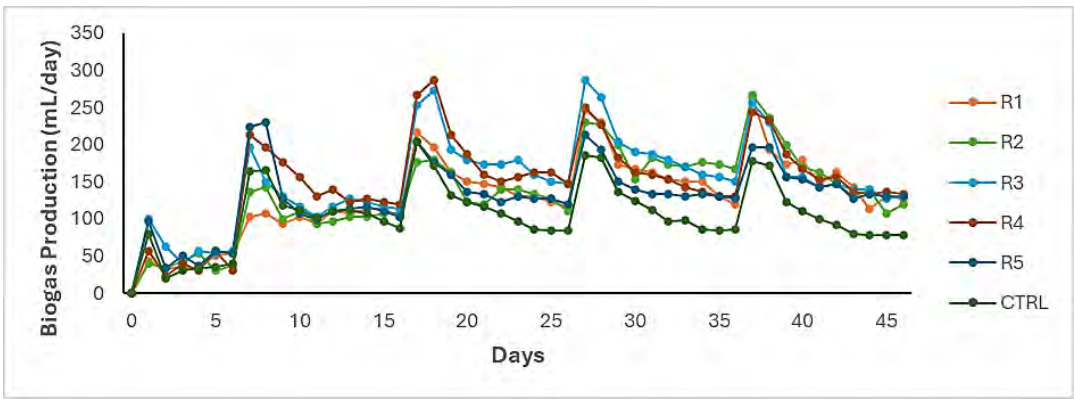


*Fig. 1 Biogas production from all formulated CHAp.*

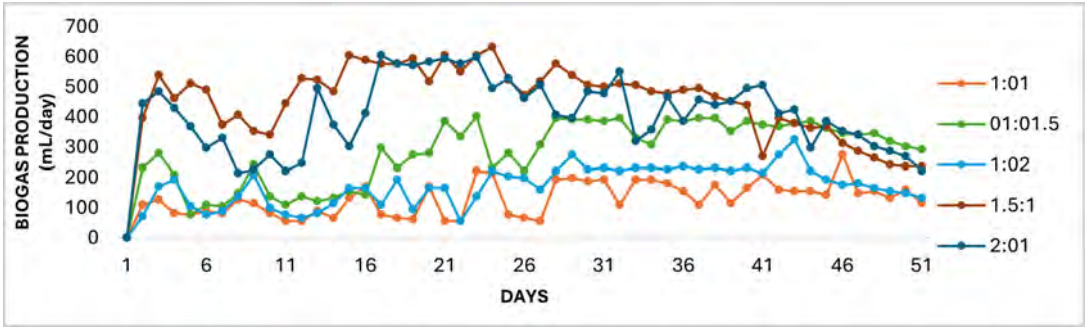


*Fig. 2 Biogas production from all formulated CHAp for HRT 14.*

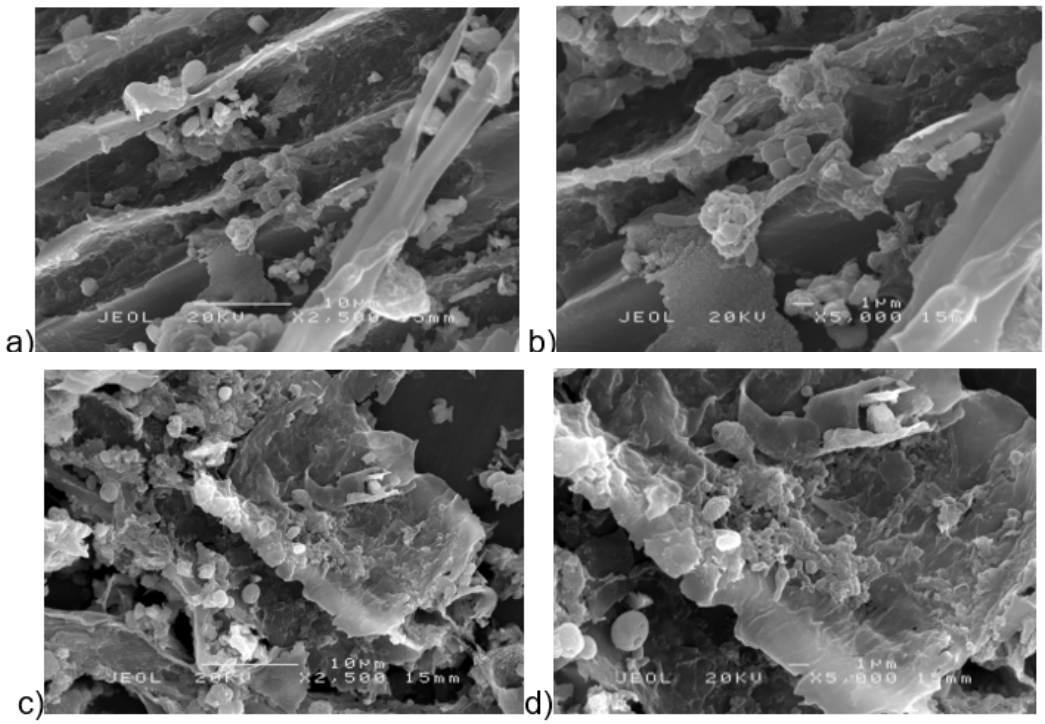


*Fig 3 SEM images of (a, b) attached cell on the CHAp-R3 surface and (c, d) is control media at 2500× magnification, and 5000× magnification respectively.*

The biofilm biomass was recorded at 44.4 g/g CHAp, with a high microbial cell attachment ratio (0.741 g cell/g CHAp). From Fig. 1 and Fig. 2, biomethane yield increased from an average of 207 mL/day to 437 mL/day, along with biofilm growth from 23.9 g/g CHAp to 44.4 g/g CHAp, when the HRT was reduced from 40 to 14 days. Fig. 3 shows the Scanning Electron Microscopy (SEM) confirmed dense biofilm growth on CHAp-$R_3$, with methanogenic archaea (Methanosarcina and Methanobacterium) observed in the porous HAp structure. The biofilm undergoes a series of stages during the growth cycle on a bio-carrier, starting with the attachment of microorganisms to the surface of the carrier. This is followed by colonization, maturation, aging, and eventually detachment [6].

The integration of nano-HAp into CHAp composites presents a promising bio-media innovation for sustainable bioenergy production and wastewater treatment. With enhanced microbial immobilization, increased biomethane yield, and improved process stability, CHAp has the potential to be a scalable and eco-friendly solution for anaerobic digestion and biological treatment processes. The rope-shaped biomedia exhibited a filamentous and porous morphology, enhancing mixing and mass transfer properties while promoting biofilm formation on the surface [7].

*References:*

*[1] Mo H, Wang N, Ma Z, Zhang J, Zhang J, Wang L, et al. Hydroxyapatite Fabrication for Enhancing Biohydrogen Production from Glucose Dark Fermentation. ACS Omega 2022;7:10550–8. https://doi.org/10.1021/acsomega.2c00059.*
*[2] Ersan M, Guler UA, Acikel U, Sarioglu M. Synthesis of hydroxyapatite/clay and hydroxyapatite/pumice composites for tetracycline removal from aqueous solutions. Process Saf Environ Prot 2015;96:22–32. https://doi.org/10.1016/j.psep.2015.04.001.*
*[3] Mohd Jamaludin NF, Jamali NS, Abdullah LC, Idrus S, Engliman NS, Abdul PM. Biohydrogen production with utilisation of magnetite nanoparticles embedded in granular activated carbon from coconut shell. Int J Hydrogen Energy 2023;48:11695–708. https://doi.org/10.1016/j.ijhydene.2022.12.073.*
*[4] Biedrzycka A, Skwarek E, Osypiuk D, Cristóvao B. Synthesis of Hydroxyapatite/Iron Oxide Composite and Comparison of Selected Structural, Surface, and Electrochemical Properties. Materials (Basel) 2022;15. https://doi.org/10.3390/ma15031139.*
*[5] Saleh Mahdi O. Preparation of Hydroxyapatite from Natural Resources Literature Review. Glob Sci Journals 2018;6:46–52.*
*[6] Tang Y, Hu J. Enhanced Methane Production from Sludge Anaerobic Digestion with the Addition of Potassium Permanganate. ACS Omega 2022;7:39884–94. https://doi.org/10.1021/acsomega.2c04132.*
*[7] Wongthanate J, Polprasert C. Immobilized biofilm in thermophilic biohydrogen production using synthetic versus biological materials. Brazilian Arch Biol Technol 2015;58:124–30. https://doi.org/10.1590/S1516-8913201502895.*

*"Innovation begins when curiosity meets discipline; research is the bridge." — ION2*

# Sustainable Synthesis of Hydroxyapatite from Polymesoda expansa Shells: A Green Approach for Biomaterial Development

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Hydroxyapatite (HA) has gained significant attention as a bone substitute material due to its biocompatibility and compositional similarity to human bone minerals. It can be synthesized through chemical methods using calcium and phosphate as raw materials. Mollusk shells, which contain approximately 94% $CaCO_3$ [1], can serve as a sustainable calcium source for HA synthesis. These shells are waste byproducts of the seafood industry, generated after the meat is harvested for consumption. Improper disposal of these shells contributes to environmental pollution. Utilizing mollusk shells for HA synthesis not only mitigates pollution but also promotes a circular economy by converting waste into valuable resources. Furthermore, the continued use of mollusks as a protein source in the seafood industry ensures a reliable calcium supply for HA synthesis, fostering an integrated system that enhances both environmental sustainability and economic circulation.

The mollusk shell used in this study is Polymesoda expansa, locally known as lokan. It is composed of calcium carbonate in the aragonite phase [2], one of the three polymorphs of calcium carbonate. The other two polymorphs are calcite and vaterite. Vaterite is the least stable under ambient conditions, aragonite is metastable, and calcite is the most stable [3]. Compared to calcite, the lower stability of aragonite makes it more soluble, which facilitates its reaction with phosphate ions during the HA synthesis process [4], [5].

In this study, HA synthesis was conducted by mixing lokan shell powder into a citrate-phosphate buffer solution at pH 7.4. The reaction was performed at room temperature and under hydrothermal conditions at 100°C for two days.

The FTIR spectrum of raw lokan shell powder (Fig. 1a) shows bands at 1082, 860, and 713–700 $cm^{-1}$, characteristic of aragonitic calcium carbonate [6], [7]. After two days of reaction at room temperature (Fig. 2b), bands at 564, 605, 962, and 1053 $cm^{-1}$, corresponding to the $PO_4^{3-}$ group in HA, appear.

The intensity of the aragonitic carbonate bands at 860 and 713–700 $cm^{-1}$ decreases, while the band at 1082 $cm^{-1}$ disappears, indicating HA formation. The formation of HA follows a dissolution-precipitation mechanism [8], in which $Ca^{2+}$ ions are released from the lokan shell, react with $PO_4^{3-}$ ions in the solution, and precipitate as HA, as represented in Equation 1:

$$10Ca^{2+} + 6PO_4^{3-} + 2OH^- \rightarrow Ca_{10}(PO_4)_6(OH)_2 \quad (1)$$

The hydrothermal reaction (Fig. 1c) shows more intense peaks corresponding to $PO_4^{3-}$, whereas the peaks for aragonitic carbonate at 860 $cm^{-1}$ become less intense, and the peak at 713–700 $cm^{-1}$ disappears. This indicates that the hydrothermal method accelerates the conversion of lokan shell into HA. Compared to the room temperature method, the hydrothermal method provides a higher temperature, which enhances the dissolution of calcium carbonate and promotes the reaction between $Ca^{2+}$ and $PO_4^{3-}$, leading to increased HA formation.

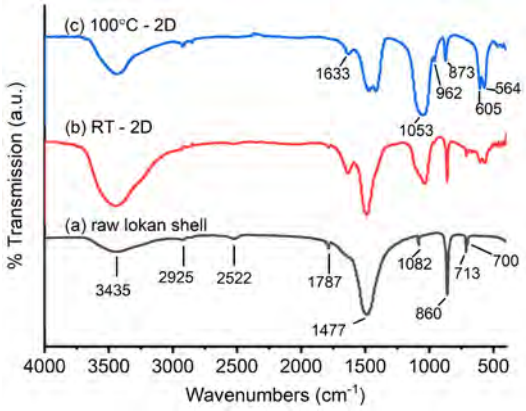


*Fig. 1. FTIR spectra of (a ) raw lokan shell, (b) sample synthesized at room temperature and (c) sample synthesized using hydrothermal method.*

The results were further supported by XRD analysis. Fig. 2b shows the XRD pattern of the sample synthesized at room temperature. After two days of reaction at room temperature, the peaks at 2θ = 26.28, 27.27, and 38.40, assigned to aragonite, become less intense, while the peak at 2θ = 33.16 disappears. A new peak, assigned to HA, appears at 2θ = 31.78, confirming HA formation.

For the hydrothermally synthesized sample (Fig. 2c), the aragonite peaks at 2θ = 26.28, 27.27, 33.16, 36.07, 38.40, 42.93, 45.90, and 48.50 disappear. In contrast, new peaks corresponding to HA appear at 2θ = 25.66, 31.78, 40.08, and 46.79, with a sharp increase in the intensity of the peak at 2θ = 31.78. These results indicate that the hydrothermal method is more effective in promoting the transformation of aragonite into HA, as evidenced by the disappearance of aragonite peaks and the sharp increase in the HA peak intensity at 2θ = 31.78. This suggests that the elevated temperature and pressure conditions in the hydrothermal process facilitate aragonite dissolution and subsequent HA reprecipitation, resulting in a material with higher phase purity and crystallinity.

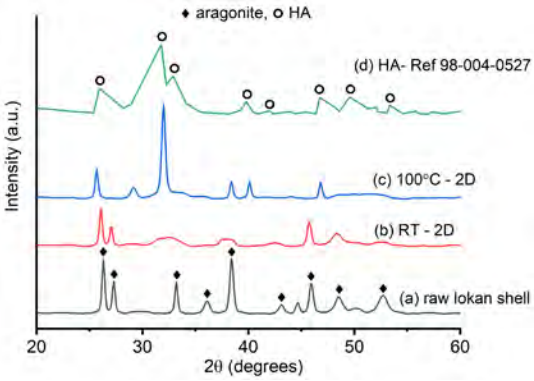


*Fig. 2. XRD patterns of (a) raw lokan shell, (b) sample synthesized at room temperature, (c) sample synthesized using hydrothermal method and (d) HA with Ref. No. 98-004-0527.*

This study successfully demonstrates the feasibility of synthesizing hydroxyapatite (HA) from Polymesoda expansa (lokan) shells using citrate-phosphate buffer at pH 7.4 under room temperature and hydrothermal conditions. The results confirm that aragonitic calcium carbonate from lokan shells serves as a suitable precursor for HA synthesis through a dissolution-precipitation mechanism.

FTIR and XRD analyses provide strong evidence of HA formation, with the hydrothermal method showing a higher degree of conversion and improved HA crystallinity compared to the room temperature method.

By utilizing waste mollusk shells, this study promotes environmentally friendly HA synthesis, contributing to waste valorization and sustainable resource management. The findings highlight the potential of lokan shells as a renewable and cost-effective calcium source for biomaterial applications.

*References:*

*[1] B. Kızılkaya, "Investigation of the Chemical Composition of the Shell Structure of Mytilus galloprovincialis Mussel From Kefken , Türkiye," Acta Nat. Sci., vol. 5, no. 1, pp. 57–68, 2024, doi: 10.61326/actanatsci.v5i1.7.*
*[2] N. H. Abdullah et al., "Removal of Phosphate from Synthetic Wastewater by Using Marsh Clam (Polymesoda expansa) Shell as an Adsorbent," Biointerface Res. Appl. Chem., vol. 13, no. 1, pp. 1–12, 2023, doi: 10.33263/BRIAC131.056.*
*[3] D. Zhao et al., "Stabilizing mechanisms of metastable vaterite in cement systems," Cem. Concr. Res., vol. 178, no. January, p. 107441, 2024, doi: 10.1016/j.cemconres.2024.107441.*
*[4] W. Park et al., "Effect of Synthetic Conditions on Morphology and Composition of Carbonate-Containing Hydroxyapatite Hydrothermally Synthesized From Calcium Carbonate," Phosphorus Res. Bull., vol. 25, no. February, pp. 72–77, 2011, doi: 10.3363/prb.25.72.*
*[5] M. Kamitakahara, et al., "Carbonate-containing hydroxyapatite synthesized by the hydrothermal treatment of different calcium carbonates in a phosphate-containing solution," J. Asian Ceram. Soc., vol. 3, no. 3, pp. 287–291, 2015, doi: 10.1016/j.jascer.2015.05.002.*
*[6] D. Chakrabarty et al., "Aragonite crystals with unconventional morphologies," J. Mater. Chem., vol. 9, no. 11, pp. 2953–2957, 1999, doi: 10.1039/a905407c.*
*[7] K. S. Singh and S. G. Sawant, "Identification of CaCO3 polymorphs of shellfish by FTIR spectroscopy and evaluation of metals adsorption by powdered exoskeleton shell," Indian J. Geo-Marine Sci., vol. 51, no. 4, pp. 304–309, 2022, doi: 10.56042/IJMS.v51i04.44058.*
*[8] R. Fernández-Penas et al., "A sustainable one-pot method to transform seashell waste calcium carbonate to osteoinductive hydroxyapatite micro-nanoparticles," J. Mater. Chem. B, vol. 11, no. 32, pp. 7766–7777, 2023, doi: 10.1039/d3tb00856h.*

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# POSTGRADUATES

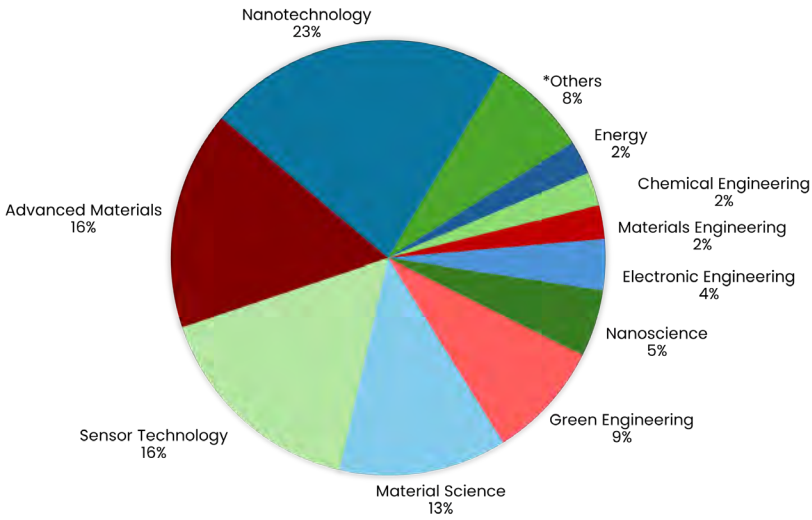
The National Nanotechnology Policy and Strategy (DSNN) 2021-2030 is the government's commitment to increasing, accelerating, and advancing nanotechnology towards driving the nation's socioeconomic growth. With a primary mission to mainstream nanotechnology in everyday life, solid commitments and support from various parties are important. Therefore, ION2 is highly committed to supporting the DSNN 2021-2030 policy by offering six fields of study related to nanoscience and nanotechnology. The fields are:

- Nanoscience
- Nanotechnology
- Advanced Materials
- Energy
- Sensor Technology
- Green Engineering

**80**

Between 2020 and 2024, ION2 produced a total of 80 graduates. This includes 6 PhD graduates and 5 Master's degree graduates who completed their studies in 2024.

**Distribution of ION2 Graduates by Field of Study (2020–2024)**

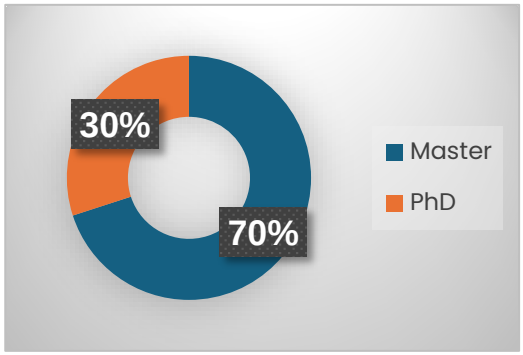



*Others
Nanomaterials and Nanotechnology, Smart Technology and Robotic, Sustainable Technology, Advanced Materials Engineering, Nanomaterials, Robotic and Automation Engineering.

## ADMISSION

Student admission refers to the number of new students who registered in 2024.

| Programme | Nationality | No. of Students |
|---|---|---|
| Master | Malaysia | 7 |
| PhD | Malaysia | 3 |




## ENROLMENT

Student enrolment refers to the total number of active students in 2024. A total of 73 students enrolled, comprising 42 PhD and 31 Master's students.

**Enrolment (Master)**

**31**

| Nationality | No. of Students |
|---|---|
| Malaysia | 29 |
| China | 1 |
| Iraq | 1 |

**Enrolment (PhD)**

**42**

| Nationality | No. of Students |
|---|---|
| Malaysia | 32 |
| China | 1 |
| Iraq | 2 |
| India | 1 |
| Libya | 1 |
| Nigeria | 3 |
| Pakistan | 2 |

*Hats off to the*

# ION2 Class of 2024!

PhD

**HELYATI BINTI ABU HASSAN SHAARI**
**Supervisor**: Mohd Nazim bin Mohtar
**Field of Study**: Electronic Engineering
**Thesis**: Synthesis of Conductive Poly(Methyl Methacrylate)/ Polyaniline Copolymer using Free Radical Polymerization Techniques

PhD

**NORZILA BINTI KUSNIN**
**Supervisor:** Nor Azah binti Yusof
**Field of Study:** Sensor Technology
**Thesis**: Electrochemical Biosensor-based on Silicon Nanowires/Platinum Nanoparticles Associated with Loop-Mediated Isothermal Amplification for Detection of Porcine DNA in Food

PhD

**SANI YUSUF**
**Supervisor:** Raba'ah Syahidah binti Azis
**Field of Study:** Nanoscience
**Thesis:** Synthesis and Electromagnetic Characterization of High Frequency Radar Absorbing Materials using Nanostructured Spinel Ferrites Nanocomposite

PhD

**LOGESWARY A/P R.M. FITER**
**Supervisor:** Yusran bin Sulaiman
**Field of Study:** Materials Science
**Thesis:** Fabrication of $Batio_3$, $Basno_3$ and Sn-Doped $Batio_3$ Compact Layers for Enhanced Dye Sensitized Solar Cell

PhD

**LOW YIIN JIAN**
**Supervisor:** Josephine Liew Ying Chyi
**Field of Study**: Advanced Materials
**Thesis:** Methylammonium Organic Cation-substituted Cesium Bismuth Bromide-Based Perovskite Prepared via Microwave-Assisted Solvothermal Method for Photovoltaic Application

PhD

**FARIZA AINA BINTI ABD MANAN**
**Supervisor:** Nor Azah Binti Yusof
**Field of Study:** Nanoscience
**Thesis:** Optimization of Aptamer-based Manganese Doped Zinc Sulphide/Chitosan and Carbon Dots/Chitosan as Drug Nanocarriers for Controlled Release of Mitomycin C

MASTER

**MUHAMMAD FARHAN BIN MUSTAFA**
**Supervisor**: Wan Zuha bin Wan Hasan
**Field of Study**: Robotic and Automation Engineering
**Thesis**: Autonomous Robot System for In-field Loose Fruit Collection

MASTER

**NUR AINA DIANA BINTI CHE DAUD**
**Supervisor:** Lim Hong Ngee
**Field of Study:** Nanotechnology
**Thesis**: Nickel-Based Metal-organic Framework for Non-enzymatic Electrochemical Sensing ff Glucose

MASTER

**WAN NADHIRAH BINTI WAN MOHD ABD KALAM**
**Supervisor:** Lim Hong Ngee
**Field of Study:** Materials Science
**Thesis:** Electrochemical Performance of Aqueous Hybrid Supercapacitor Based on Lithium Iron Phosphate/Silicon/Graphene Composite

MASTER

**LEWINA BINTI RAJUN**
**Supervisor:** Abdul Halim bin Abdullah
**Field of Study:** Materials Science
**Thesis:** Degradation of Methyl Orange by Silver Phosphate Coupled with Niobium Oxide Immobilized into Polyethersulfone Membrane

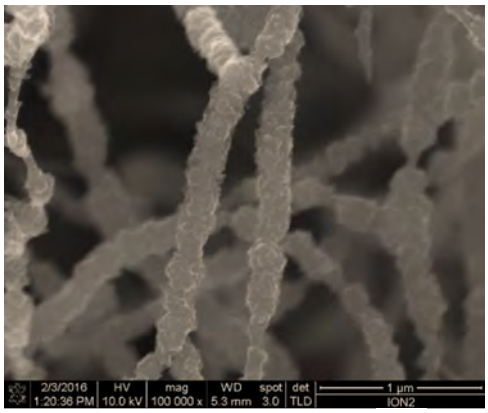
MASTER

**CHEN HONGXU**
**Supervisor:** Raba'ah Syahidah binti Azis
**Field of Study**: Advanced Materials
**Thesis:** Improvement of Microwave Absorption Properties via Ceramic Method and Mechanical Alloying Processing of Ti-Co-Mn-Ni Substituted Barium Ferrite

"Education is not preparation for life; education is life itself."

# FIELDS OF STUDY

At ION2, students have the opportunity to delve into cutting-edge fields of study through six specialised programs. Designed to cultivate expertise in nanoscience and nanotechnology, these programmes provide advanced knowledge and hands-on skills, preparing graduates to excel in this rapidly evolving industry.




## NANOSCIENCE

The nanoscience field of study is designed to prepare the students with nanoscience knowledge in any material field, including metal and metal oxides, carbon nanomaterials, nanocomposite and others. Nanoscience studies matter, particles, and structures at the nanometer scale, including atoms and molecules. It explores how these interactions lead to unique properties different from those observed in microscale materials due to quantum mechanics. Metal and metal oxide nanoparticles are noteworthy for their exceptional optical, electronic, magnetic, and electrochemical properties. Carbon nanomaterials, like carbon quantum dots, carbon nanotubes, graphene, and graphene oxide, are gaining prominence as emerging nanomaterials. Metal-organic frameworks (MOFs), a type of porous crystalline materials made up of metal ions linked by organic ligands, offer a fascinating class of nanomaterials with numerous potential applications. Various cutting-edge techniques will be employed to analyse and characterise nanomaterials, including microscopy and spectroscopy techniques as well as thermal analysis. These characterisation techniques help understand and exploit nanomaterials' unique properties for diverse industrial.

## NANOTECHNOLOGY

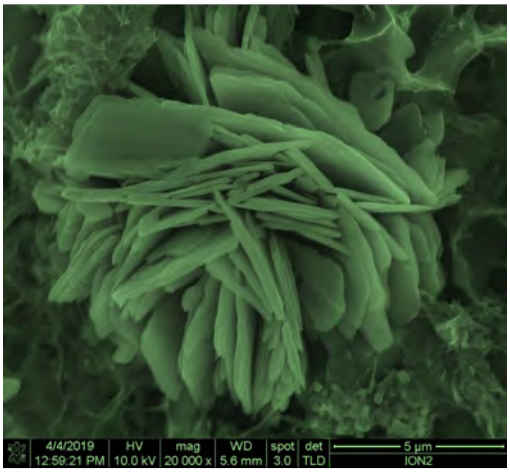
The nanotechnology field of study is designed to prepare students with knowledge related to nanotechnology, which deals with developing state-of-art materials, devices, or other structures with at least one dimension sized from 1 to 100 nanometers. Nanotechnology harnesses the power of nanoscience to produce revolutionary nanomaterials and nanoscale components with limitless applications. It enables the creation of tailor-made materials with exceptional properties. Furthermore, nanotechnology can facilitate the establishment of interfaces between electronic and biological systems. Nanotechnology entails the application of fields of science as diverse as surface science, organic chemistry, molecular biology, semiconductor physics, and microfabrication. Some typical nanotechnology applications are in sensors, delivery systems, 'smart' medicines, nanoabsorbents, nanoelectronics, nanomachines, active and intelligent packaging, and others.

## ADVANCED MATERIALS

The advanced materials field of study is designed to educate students in materials and processes, emphasising the exploration and creation of engineered materials with exceptional or enhanced properties. These enhanced properties result in superior performance relative to conventional materials, effectively bridging the gap between high-tech and conventional industries at a graduate level. The primary goal of the programme is to equip students with comprehensive and multidisciplinary knowledge that addresses contemporary issues and practices in the field of advanced materials. This programme introduces students to advanced materials such as composites, ceramics, electronic materials, magnetic materials, smart materials, plastics, and polymers. By gaining an in-depth understanding of these topics, students are better prepared to address real-world challenges and contribute to the innovative advancement of various industries.

## GREEN ENGINEERING

The green engineering field of study is designed to prepare the students to be able to integrate environmental impact assessment tools, adopt life-cycle thinking, ensure that all material and energy inputs and outputs are as inherently safe and inert as possible, minimise the depletion of natural resources, and avoid waste. Green engineering is a sustainable approach to the design, production, and use of processes, materials and products that minimise pollution, reduce risk to human health and the environment, and enhance economic viability and efficiency. With green engineering, critical decisions to safeguard human health and the environment are made early in the process or product development stage, maximising cost-effectiveness.




## ENERGY

The field of study in energy is designed to prepare students for design and develop most of new technologies related to harnessing energy. It encompasses fundamental and applied research on the development, design, and usage of renewable energy, energy storage and energy materials. Research areas for renewable energy covers solar, wind, biomass, and hydrogen, while energy storage covers technologies such as batteries, supercapacitors, and other methods to store energy for later use, enabling better integration of intermittent renewable energy sources. Energy materials such as advanced catalysts, photovoltaic materials, and high-performance materials are explored and developed to optimise their cost and performance, enabling economic viability for energy applications.

## SENSOR TECHNOLOGY

The sensor technology field of study is designed to focus on the design and development of sensors to meet the needs for growth in products and services that utilise information from different types of sensors. Sensor technology has a very important role as the key technology to support a wide variety of research and industrial applications. It is also a vital element that can be applicable in agriculture, water quality, food security, the environment, and healthcare. The study of sensor technology can include sensor devices, physical sensors, biosensors, and chemical sensors. This programme aims to allow students to acquire knowledge of sensor technology covering the design, development, fabrication and performance analysis of the developed sensors.

## INDUSTRIAL COLLABORATIONS

### EDS Malaysia Summer School 2024

The EDS Malaysia Summer School 2024, co-organised by FNDL, wrapped up its three-day program (August 5–7) at the Faculty of Engineering and ION2, drawing 35 participants eager to explore flexible electronics. This year's edition blended expert talks, industry engagement, and hands-on sessions covering flexible circuits, biomedical applications, and inkjet-printed RFID. Highlights included lectures on emerging technologies, an industrial visit to Khai Lien Silk Screen, and practical workshops on screen printing and sensor testing, led by Dr. Intan Helina Hasan with SPTech Sdn. Bhd. Marking the first collaboration between ION2 and IEEE-EDS Malaysia, the program deepened technical expertise and fostered industry connections in this fast-evolving field.

Speaker Lineup:

- Prof. Dr. Mohd Nizar Hamidon (UPM): Introduction to Flexible Electronics
- Prof. Ir. Dr. Norhayati Soin (UM): Flexible and Printed Electronics for Biomedical Applications
- Dr. Syed Mohd Hafiz (MIMOS): Inkjet Printed Flexible RFID Device
- Assoc. Prof. Dr. Benjamin C.K Tee (NUS): Nano/Micro-Materials and Fabrication Techniques for Flexible and Stretchable Electronic Sensor Devices
- Assoc. Prof. Dr. Asrulnizam Abd. Manaf (USM): Lab-on-Flexible Hybrid Printed Circuit Board (LoFHPCB)-CMOS Platform for Electrochemical-based Sensing System Devices

### Revolutionizing Eco-Friendly Food Packaging

ION2, in close collaboration with our research partners, including the University of Wollongong Malaysia (UOW Malaysia), the Advanced Manufacturing Research Group (AMReG), Universiti Kebangsaan Malaysia, and Cahya Mata Alam Sdn. Bhd. (Thermasite™), has successfully revolutionised equipment and food packaging innovation using green technology (biodegradable) in Malaysia. The creation of the prototype of eco-friendly food utensils, named "PLATES: PLA-Tapioca Eco-Friendly Solutions," is a testament to the integral role played by our researchers in reducing the use and disposal of single-use plastic waste. This project has been made possible through the generous support of research grants from the Ministry of Higher Education, UPM, and UOW Malaysia.


*From left:*
*Ts. Dr. Nishata Royan Rajendran Royan, Ts. Dr. Mohd Hafizuddin Ab Ghani and Muhammad Fadzlee Firas Mohd*

### MICROTRAC Seminar on Particle Size Analysis at ION2

A seminar entitled "Particle Size Analyser & Characterisation of Nanoparticle Products with MICROTRAC" has been organised by Interscience Sdn Bhd in collaboration with ION2 in May 2024. The event featured Paul Cloake, the Global Sales Director of MICROTRAC, as the speaker. The seminar attracted 20 participants who had the opportunity to try some of the equipment displayed at the event.

*"The presentation was very fruitful, and the equipment was advanced."*

## UNIVERSITY LINKAGES

### International Guest Lecture Series

On January 29, FNDL commenced its first International Guest Lecture Series of 2024 with a talk by Dr. Wei Wen Wong from the Australian National University (ANU). His lecture, "Bottom-up III-V Micro-Ring Laser Cavities: Exploring a New Horizon for Integrated Photonics," explored fabrication techniques, key characteristics, and applications of these advanced photonic devices.

Dr. Wong, an expert in nanotechnology and photonics, shared insights from his research journey, from MMU Malaysia to ANU, highlighting the transformative potential of micro-ring laser cavities. The session, attended by 20 participants, sparked discussions on the latest innovations in integrated photonics.


*Dr. Wei Wen Wong during his lecture at ION2.*

## ION2 Strengthens Ties with University of Hertfordshire

On April 17, ION2 hosted a research collaboration meeting with the University of Hertfordshire (UH), UK, aimed at advancing multidisciplinary research in medicine, nanomaterials, energy, AI in health, and quantum information. The discussion also highlighted securing international grants for sustainable funding. Led by UH's Prof. Dr. John Senior, the meeting brought together experts from ION2, INSPEM, WiPNET, and i-AQUAS, fostering meaningful discussions on future collaborations. The session ended on a high note, reinforcing ION2's commitment to global partnerships and impactful scientific advancements.

*Prof John (blue shirt) together with UPM researchers after the fruitful meeting.*

## CRISPR & Biosensors: Prof. Ozsoz's Insightful Lecture

FNDL hosted its second International Guest Lecture Series of 2024 on June 5, featuring Prof. Dr. Mehmet Ozsoz from Near East University, Turkiye. His talk, "CRISPR Biology and Electrochemical CRISPR-Based Biosensors," explored the revolutionary role of CRISPR technology in genetic research and diagnostics.

A leading expert in electrochemical biosensors, Prof. Ozsoz has over 150 publications and an H-index of 46. His research has been featured in top journals like ACS Analytical Chemistry and Biosensors & Bioelectronics. He is also a recipient of TUBITAK's Science Award in Chemistry.

The lecture drew 40 participants, including UPM researchers and students, who engaged in discussions on CRISPR biosensors' potential applications in medical diagnostics and environmental monitoring.

### ION2 Explores Jeol FESEM at USIM

ION2 visited Universiti Sains Islam Malaysia (USIM) on July 25 for a hands-on Jeol Field Emission Scanning Electron Microscope (FESEM) demonstration led by Jeol's expert, Mr. Tan, with support from Mr. Low and Dr. Rizuan Mohd Rosnan.

The ION2 delegation, including Dr. Ismayadi Ismail, Ts. Dr. Mohd Hafizuddin Abd Ghani, and Mr. Md Ali Rani, gained insights into the technical capabilities, costs, and maintenance of the Jeol FESEM. The two-hour session fostered knowledge exchange between ION2 and USIM, strengthening collaboration and enhancing expertise in FESEM technology.


*ION2 delegation with Jeol's experts.*

## COMMUNITY ENGAGEMENTS

### ION2 Engages SMK Puchong Utama 1 Students in Nanotechnology

ION2 welcomed students and teachers from SMK Puchong Utama 1 for an immersive STEM experience on January 24. Led by Puan Nurma Abu Hassan Basheri, the visit aimed to inspire young minds through hands-on exposure to nanotechnology research.

Prof. Ir. Ts. Dr. Suraya Abdul Rashid, who was the Deputy Director of ION2 at the time, introduced the institute and the world of nanoscale materials, while Dr. Umer Rashid highlighted the importance of green sustainability. Students toured cutting-edge labs, exploring advanced technologies like FESEM, Raman Spectroscopy, and XRD.

The visit fostered curiosity and excitement about STEM careers, reinforcing ION2's commitment to nurturing future scientists and innovators.

*ION2 representatives with teachers and students of SMK Puchong Utama .*

*Prof. Ir. Ts. Dr. Suraya Abdul Rashid introduced ION2.*

## ION2 Inspires Students on Plastic Recycling

ION2 brought sustainability education to SMK Kajang Utama on June 5, through its "Knowledge Transfer Program: Plastics and Recycling Methods." The initiative aimed to raise awareness about plastic pollution and encourage responsible recycling habits among students.

As part of the event, ION2 launched the "Education Module for Series 1 School Students," a hands-on guide for tracking plastic use and waste reduction efforts. Interactive activities like "Know Plastics," "Finding Microplastics," and "Sort Your Waste" engaged students in the principles of Reuse, Reduce, and Recycle (3R).

Led by Prof. Assoc. ChM. Dr. Norizah Abdul Rahman under KTGS@ION2, the program empowered students to make a start for a greener future, reinforcing ION2's commitment to community-driven environmental awareness.

## SMK Sungai Ruan Students Explore Nanotechnology at ION2

33 students and four teachers from SMK Sungai Ruan, Pahang, visited ION2, UPM, for an immersive learning experience in nanoscience and nanotechnology on September 10.

Deputy Director Assoc. Prof. Dr. Jaafar Abdullah welcomed the group, followed by Ms. Roslina Abdul Rashid's introduction to ION2's cutting-edge research. Students toured advanced labs, gaining firsthand exposure to high-tech equipment and conductive paste research by Dr. Intan Helina Hasan. The visit aimed to inspire future scientists by showcasing real-world applications of nanotechnology. ION2 hopes to ignite students' passion for STEM and appreciates SMK Sungai Ruan for choosing ION2 as a learning destination.

## NanoINO Workshop: Equipping Educators Through Nanotechnology

As part of ION2's knowledge transfer initiative, the NanoINO community program introduced secondary school teachers to nanoscience and nanotechnology through a workshop series funded by the KTGS@ ION2 grant. Led by Assoc. Prof. Dr. Yap Wing Fen, Head of FNDL, the first session on July 17 provided 10 teachers with insights into nanotechnology-based innovation and design projects, encouraging their participation in district and national competitions.


Continuing the first session, the second session of the NanoINO: Nanotechnology Innovation Project Knowledge Transfer Program was conducted physically at ION2 on October 2. This hands-on program engaged 35 students and four teachers from SM Sains Tuan Aishah Rohani and SMK Dato' Haji Mohd Redza, Seremban, Negeri Sembilan. It enhanced the knowledge of teachers and students, equipping them to compete in scientific innovation. ION2 continues to support STEM education and promote nanotechnology at the school level.

## *Kem Nanosains* 2.0

The *Kem Nanosains* 2.0, organised by ION2, Universiti Putra Malaysia (UPM) in collaboration with the National Nanotechnology Centre (NNC), MOSTI, successfully introduced 94 students from Form 4 and Form 5 to the world of nanoscience. Held on September 18-19 as part of National Science Week, the camp aimed to spark interest in STEM while supporting the national nanotechnology agenda.

Students engaged in interactive sessions that connected theoretical chemistry concepts with real-world nanotechnology applications. The opening ceremony featured Ts. Mohd Helme Mohd Helan, Acting Director of NNC, together with ION2 top management, including Prof. Ir. Ts. Dr. Suraya Abdul Rashid and Assoc. Prof. Dr. Jaafar Abdullah. Prof. Suraya highlighted the initiative's impact, stating, "We hope this program will inspire future scientists and strengthen STEM education in Malaysia." The overwhelmingly positive response from students reinforced the camp's success in fostering scientific curiosity and innovation.


## NanoDidik 2024: Empowering Teachers with Nanoscience

On October 22, the NanoDidik 2024 program, organised by ION2, UPM, in collaboration with National Nanotechnology Center (NNC), MOSTI, equipped teachers from the Selangor districts of Petaling Perdana, Kuala Selangor, and Hulu Langat with hands-on nanoscience and nanotechnology skills for classroom applications.

Over two days, participants engaged in interactive activities, including building a wireless circuit, an innovation by ION2 researchers and working with high-tech equipment. “This experience offers a fresh perspective on science, and we’re eager to share it with our students,” said Puan Maznah Mohamed from SMK Sri Indah.

Officiated by Ts. Mohd Helme Mohd Helan, Acting Director of NNC, and supported by ION2 Director, Prof. Ir. Ts. Dr. Suraya Abdul Rashid, the program emphasised the importance of advancing science education. Despite scheduling challenges, NanoDidik remains a vital platform for equipping teachers with cutting-edge scientific knowledge to inspire future innovators.


*Ts. Dr. Mohd Hafizuddin with Prof. Dr. Chawalit Ngamcharussrivichai (blue shirt) at Chulalongkorn University, Thailand*

## MOBILITY PROGRAMMES

*ION2 Strengthens Global Research & Academic Engagement*

### Expanding Research Horizons

ION2 staff and students are making waves internationally through research attachments and internships at Chulalongkorn University (CU), Thailand, and Kyushu Institute of Technology (KYutech), Japan.

Ts. Dr. Mohd Hafizuddin explored nano-composite materials in a week-long program, while PhD student Balkis Hazmi spent three months testing her catalysts for a jet fuel project at CU under Prof. Dr. Chawalit Ngamcharussrivichai.

Muhammad Aliyu underwent a six-month research stint in materials science at Kyutech, under Prof. Assoc. Dr. Tsubota Toshiki.

### Empowering Students in Academic Writing

ION2, in collaboration with i-PUTRA, organised a high-impact research writing seminar featuring Prof. Dr. Chawalit Ngamcharussrivichai on October 29. The virtual event attracted 232 participants worldwide, focusing on effective research storytelling and structuring impactful papers.

Meanwhile a separate AI-powered academic writing webinar, co-hosted with King Abdulaziz University on December 13, showcased Dr. Imtiaz Ali's expertise in integrating AI for research writing. The session drew 140 participants, highlighting AI's role in refining research workflows.

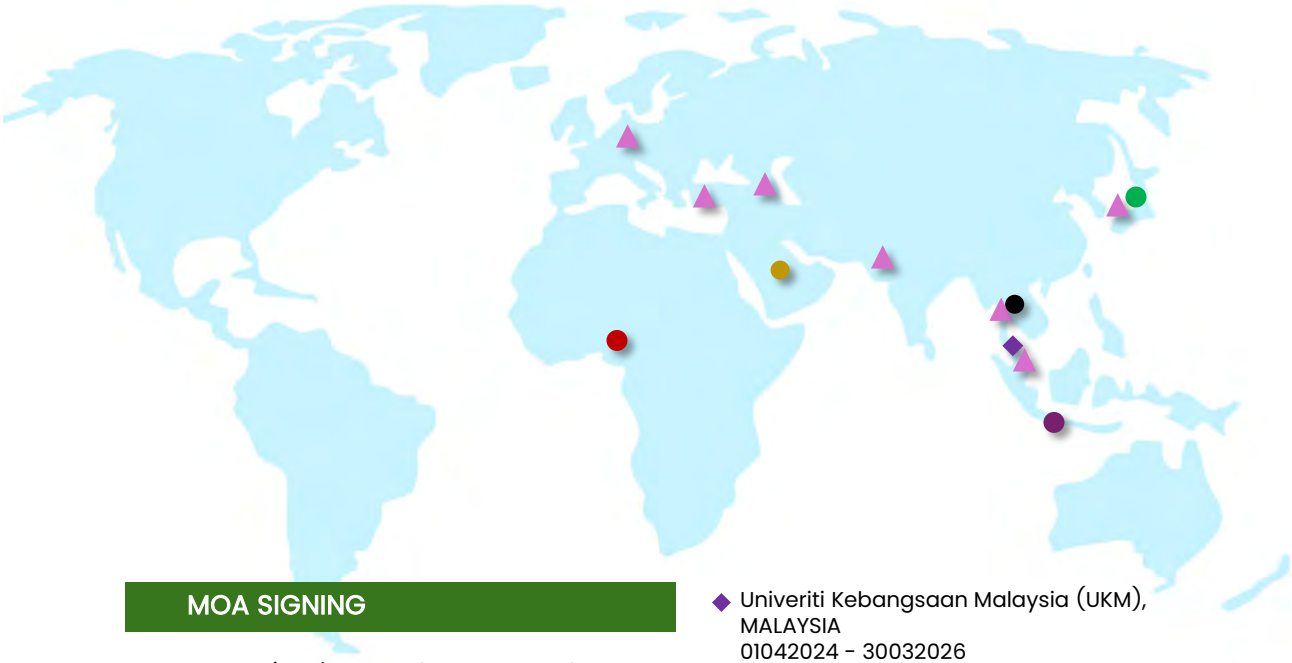
Through global collaborations and knowledge sharing, ION2 strengthens research excellence and international academic engagement.

## INBOUND PROGRAMMES 2024

- Kano University of Science and Technology
  NIGERIA I 1 participant
- Kyushu Institute of Technology
  JAPAN I 6 participants
- Universitas Brawijaya
  INDONESIA I 5 participants

## OUTBOUND PROGRAMMES 2024

- King AbdulAziz Univsersity
  SAUDI ARABIA I 2 participants
- Chulalongkorn University
  THAILAND I 3 participants
- Kyushu Institute of Technology
  JAPAN I 1 participant
- Universitas Brawijaya
  INDONESIA I 1 participant



## MOA SIGNING

- International Battery Center, MALAYSIA
  01042024 - 30032026
- Collaborative Research in Engineering, Science and Technology (CREST), MALAYSIA
  01042024 - 30032026
- The Mahmood & Ragayah Foundation, MALAYSIA
  27112024 - 26112025
- Univeriti Kebangsaan Malaysia (UKM), MALAYSIA
  01042024 - 30032026
- Malaysia Industry Government Group for High Technology (MIGHT), MALAYSIA
  01012024 - 31122025
- NAY Biosensor, MALAYSIA
  01102024 - 30092025
- Biogenes Technologies, MALAYSIA
  01102024 - 30092025

▲ ACTIVE MOU/MOA


# ACTIVITIES

## The 8th International Symposium on Advanced Materials and Nanotechnology (iSAMN2024)

iSAMN2024 was successfully held on October 8–9 at Bangi Resort Hotel, Bandar Baru Bangi. This prestigious event, organised by Nanomaterials Processing and Technology Laboratory of ION2, was held in collaboration with the National Nanotechnology Centre (NNC), Ministry of Science, Technology and Innovation (MOSTI) as part of the 10th National Nano Program (nanoKEB), which took place from October 6–12 at the same venue.



The conference was officially inaugurated by Dato' Ts. Dr. Aminuddin bin Hassim, Secretary General of MOSTI. The opening ceremony was further honoured by the presence of esteemed VIPs, including Prof. Dr. Zamberi bin Sekawi, UPM Deputy Vice-Chancellor (Research and Innovation), Ts. Mohd Helme bin Mohd Helan, Acting Director of NNC, Ts. Dr. Daniel Bien Chia Sheng, Senior Vice President of NanoMalaysia Berhad, the Dean of the UPM Faculty of Science, and UPM's Chief Librarian.



## iSAMN2024 "Nanotechnology Pathway to Net-Zero Emissions by 2050 - The theme"

iSAMN2024 featured distinguished keynote and invited speakers, renowned experts in nanotechnology from both local and international institutions.

Their presentations highlighted groundbreaking research and innovations in nanotechnology, focusing on sustainable solutions aligned with the United Nations Sustainable Development Goals (SDGs).

The two-day symposium attracted more than 80 participants from Malaysia, India, Thailand, Australia, Japan, Vietnam, and Nigeria, showcasing over 50 research presentations covering diverse fields of nanotechnology.

Beyond knowledge-sharing, iSAMN2024 served as a crucial platform for fostering strategic international collaborations between academia and industry, reinforcing collective efforts to address global environmental challenges. The partnership between ION2 and NNC demonstrates Malaysia's commitment to a sustainable and carbon-neutral future, highlighting the critical role of nanotechnology in achieving net-zero emissions.

# ION2 Silver Jubilee Celebration

ION2 celebrated its 25th anniversary with a warm and memorable Silver Jubilee event on November 27, bringing together staff, students, and alumni to honour its legacy of innovation and progress. The event highlighted past achievements, recognised key contributors, and set the stage for future advancements.

Distinguished guests, including UPM Deputy Vice-chancellor for Academic and International Affairs, Prof. Dr. Ismi Arif Ismail, and The Mahmood and Ragayah Foundation Founders, Dato' Dr. Mahmood Merican Osman Merican and Datin Ragayah Mohamed Eusoff, graced the occasion. YBhg Prof. Dr. Borhanuddin Mohd Ali, ION2's 3rd Director, also commemorated the event. A defining moment of the celebration was the unveiling of the ION2 Time Capsule, a symbolic tribute to the institute's journey and aspirations for the next 25 years.

Complementing the event, attendees enjoyed a variety of fun-filled activities; from a fun walk and traditional games to food and photography booths, creating a lively and engaging atmosphere. With participation from ION2 staff, UPM students, and alumni, the event fostered a strong sense of companionship and pride in the institute's persistent impact.

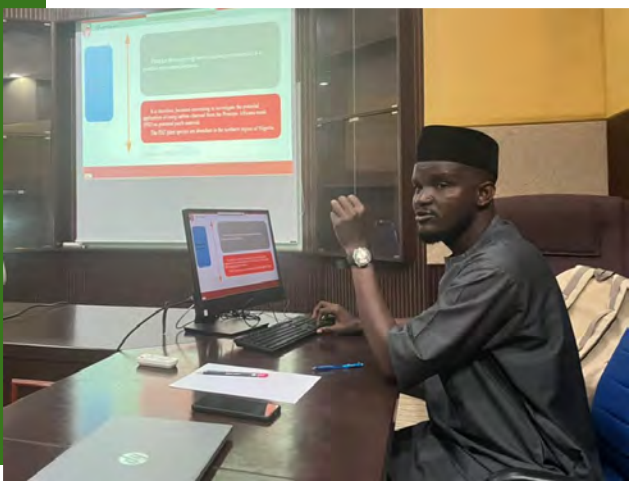

# Memorandum of Agreement (MoA) Signing Ceremony for Putra Mahmood Merican & Ragayah Eusoff Endowment

As part of the ION2 Silver Jubilee celebration, the institute marked a major milestone with the signing of a Memorandum of Agreement (MoA) with the Mahmood and Ragayah Foundation (M&R Foundation). Established by Dato' Dr. Mahmood Merican Osman Merican and Datin Ragayah Mohamed Eusoff, the foundation pledged a growth endowment to support ION2's cutting-edge research initiatives, bolstering a shared commitment to advancing scientific discovery.

The MoA was signed by Dato' Prof. Dr. Ahmad Farhan Mohd. Sadullah, UPM Vice-Chancellor and Dato' Dr. Mahmood Merican as M&R Foundation co-founder. Prof. Dr. Ismi Arif Ismail completed the MoA exchange as the representative of the Vice-Chancellor, witnessed by ION2 Director Prof. Ir. Ts. Dr. Suraya Abdul Rashid and M&R Foundation co-founder Datin Ragayah Mohamed Eusoff.

## Mock Viva Program for Potential GoT Students

PhD and Master's students at ION2 participated in the Mock Viva programme held on February 27, designed to strengthen their thesis defenses through expert feedback. The session was organised by the ION2 Postgraduate Committee as part of ongoing efforts to support academic readiness. GoT, or Graduate on Time, refers to students who complete their degrees within the expected timeframe, a key benchmark of academic progress at ION2.



## Program Borak Tepi: Entrepreneurship and Career

The ION2 Postgraduate Club, in collaboration with UPM's Graduate Entrepreneurship and Marketability Development Center (CEM), hosted the insightful "Borak Tepi: Entrepreneurship and Career" session on 27 February. The event featured CEM Director, Associate Prof. Dr. Mass Hareeza Ali, who shared inspiring success stories and practical entrepreneurial guidance with aspiring graduates.

## 5th Malaysian MOFs Workshop 2024

The 5th Malaysian Metal-organic Frameworks (MOFs) Workshop took place from April 16–18, at UPM's Institute of Nanoscience and Nanotechnology, bringing together 15 researchers and students for expert-led sessions, discussions, and networking. Hosted by FORMS Laboratory, ION2, and the Faculty of Science, UPM, in collaboration with the Malaysian Analytical Sciences Society (ANALIS) and the Persatuan Sains dan Teknologi Keadaan Pepejal Malaysia (MASS), the workshop covered MOF fundamentals, synthesis, characterisation, and applications, including a hands-on session.

Featuring Prof. Seungkyu Lee from the University of Hong Kong as the keynote speaker, along with 10 other experts, the event provided valuable knowledge and practical exposure, solidifying its reputation as a premier hub for MOFs knowledge.

## Nanomaterials Technology Webinar by NPTL

NPTL hosted its annual Nanomaterials Technology Webinar on February 29 via Google Meet, continuing its tradition since 2020. The two-hour session featured Dr. Mohd Nor Faiz Norrahim (Universiti Pertahanan Nasional Malaysia) on Nanocellulose for Military Defense and Dr. Elsa Antunes (James Crook University) on Nanomaterials for Biomedical Applications. The event attracted 33 participants, sparking a dynamic Q&A session, reflecting strong engagement in both topics.


## PhD Students Share Global Mobility Insights

ION2 in collaboration with i-PUTRA and postgraduate committees, hosted a webinar titled "Outbound Mobility Beyond Borders" on May 15. The session served as a platform for ION2 students to share their experiences abroad, aiming to broaden the perspectives of fellow students on international study opportunities.

The featured speakers included:

- Balkis Hazmi (Chulalongkorn University, Thailand – 3 months)
- Muhammad Aliyu (Kyushu Institute of Technology, Japan – 6 months)
- Rathi Devi Nair (Universitas Brawijaya, Indonesia – 1 week)

Moderated by Ts. Dr. Mohd Hafizuddin Ab Ghani, the webinar garnered 60 participants, reflecting a strong and growing interest in global academic mobility among the student community.

## ION2 Recycling Campaign Promotes Sustainability

ION2 organised a Recycling Campaign on May 24, drawing enthusiastic participation from UPM staff, students, and the Serdang community. Held alongside the Gotong-Royong Perdana Program and Preloved to Love Sale, the event aimed to nurture green sustainability practices.

ION2 Director Prof. Ir. Ts. Dr. Suraya Abdul Rashid, launched the event, followed by an informative talk on recycling awareness by Ts. Dr. Mohd Hafizuddin Ab Ghani. Briefings on the cleanup drive and used-item sale were delivered by Puan Siti Nur Lidiya and Puan Rosiha, respectively.

Participants contributed recyclable items such as books, paper, plastic bottles, and used oil, receiving digital certificates for their efforts. The campaign reinforced the importance of recycling and environmental conservation within the ION2 community.


## ION2 Director's 100-Day Message

ION2 marked 100 days under the leadership of Prof. Ir. Ts. Dr. Suraya Abdul Rashid with a special ceremony attended by top management, researchers, and staff on May 21.

Prof. Suraya reflected on her eight-year journey with ITMA and ION2 before assuming the directorship on February 1. She outlined ION2's strategic research direction and organisational structure, setting a clear vision for the future. Expressing gratitude to the team, she encouraged continued dedication to advancing UPM's mission and vision.

## ION2 Hosts Record Disposal Briefing & Workshop

ION2 in collaboration with the Sultan Abdul Samad Library (PSAS), organised a Record Disposal Procedure Briefing and Workshop on May 10. The session aimed to enhance proper record disposal practices in line with National Archives of Malaysia guidelines.

Attended by 33 ION2 officers and staff, the workshop featured PSAS mentors led by Mr. Muizzudin Kaspol. While Ms. Norhazura Hamzah conducted a briefing covering record segregation, disposal training, approval document preparation, and destruction simulations. The workshop successfully improved record management efficiency, ensuring compliance with national guidelines.


## HICoE Site Assessment

On June 20–21, ION2 underwent a site assessment for the Higher Education Center of Excellence (HICoE), conducted by panelists from local universities and representatives from the Higher Education Ministry (KPT) after meeting the minimum requirements in the initial assessment.

The session was attended by UPM Vice Chancellor, YBhg. Dato' Prof. Dr. Ahmad Farhan Mohd Sadullah, who commended ION2's efforts in nanotechnology advancements and expressed confidence in its HICoE potential. The panel also toured ION2's labs and high-tech facilities, delivering positive feedback during the closing session.

ION2 remains optimistic about securing HICoE recognition, thanking its dedicated team for their hard work in preparing for the evaluation.

## ION2 Conducts In-House Weighing Balance Verification Training

The ION2 Equipment Maintenance and Calibration Committee held an in-house verification training on July 11, led by Cik Nurnazeera bt. Zulkefli, Technical Manager of ION2's Mass Metrology Laboratory. Designed for science officers and assistant engineers, the session focused on weighing balance verification techniques.

Participants learned about audit findings, verification concepts, proper usage, maintenance, and calibration analysis through hands-on exercises. The training aimed to enhance measurement accuracy and equipment management, underlining ION2's commitment to research excellence.

## Intellectual Property Clinic Promotes Research Protection

ION2 in collaboration with Putra Science Park (PSP), UPM, organised the Intellectual Property Clinic 2024 to enhance awareness and knowledge of intellectual property (IP) rights among staff and students on 15 August.

The two-hour session brought together academics, researchers, and postgraduate students, offering direct engagement with IP experts led by Ts. Dr. Saiful Hasley Ramli, Deputy Director of PSP. PSP aims to expand such initiatives to broaden IP awareness and encourage competitive innovation at national and international levels.

*""Innovation begins with knowledge—understanding biosensors today paves the way for groundbreaking applications tomorrow." – ION2*

## ION2 Workshop on Biosensors: Advancing Innovation

### *Preliminary Seminar- Biosensors: Introduction and Applications*

FNDL hosted a hybrid seminar titled "Biosensor: Introduction and Applications", providing fundamental insights into biosensor technology and its real-world applications on June 16.

The seminar, presented by Prof. Dr. Lee Yoo Heng (UKM), explored chemical and nanomaterial-integrated biosensors for food safety, environmental monitoring, and hazard detection. With 30 in-person and 104 online attendees, the event sparked engaging discussions. It served as a precursor to the advanced biosensor workshop in August.


### *Advanced Workshop- Nanomaterials Application & Modification in Biosensor Design*

On August 13-14, the Nanomaterials Application & Modification in Biosensor Design Workshop, organised by FNDL, ION2 and Faculty of Science, UPM provided hands-on experience in biosensor fabrication and testing.

Day one featured expert talks from Prof. Lee Yoo Heng, Assoc. Prof. Dr. Jaafar Abdullah, and Assoc. Prof. Dr. Yap Wing Feng, covering topics such as electrochemical biosensors, nanomaterials for sensor modification, and Surface Plasmon Resonance (SPR) applications.

Day two focused on practical training, where participants conducted SPR and electrochemical sensor measurements, applying their theoretical knowledge to real-world scenarios. This successful program demonstrated ION2's commitment to biosensor innovation, enabling researchers to develop cutting-edge expertise in nanotechnology-driven sensing solutions.

## Re-assessment Audit MS ISO/IEC 17025: Upholding Excellence at ION2

The Characterisation Laboratory and Mass Metrology Laboratory at ION2 underwent a re-assessment audit for MS ISO/IEC 17025 compliance, conducted by the Department of Standards Malaysia on September 6.

The audit team, led by Chang Hon Fong, with Lee Ah Lek (Chemical Scope) and Lai You Heng (Calibration Scope), conducted a thorough evaluation, including document and record reviews, as well as on-site witnessing of laboratory operations. Puan Sarinawani, as Quality Manager, led the ION2 team throughout the process.

*"Quality is not just about meeting standards; it's about continuous improvement, precision, and a commitment to excellence." – ION2*

## Post-iSAMN2024 Workshop: Exploring Nanocatalyst Synthesis & Characterisation

The post-iSAMN2024 workshop, Exploring Nanocatalyst Synthesis & Characterisation, was held on October 10 at NPTL, ION2, offering hands-on exposure to nanocatalyst synthesis techniques and characterisations to participants from local and international institutions.

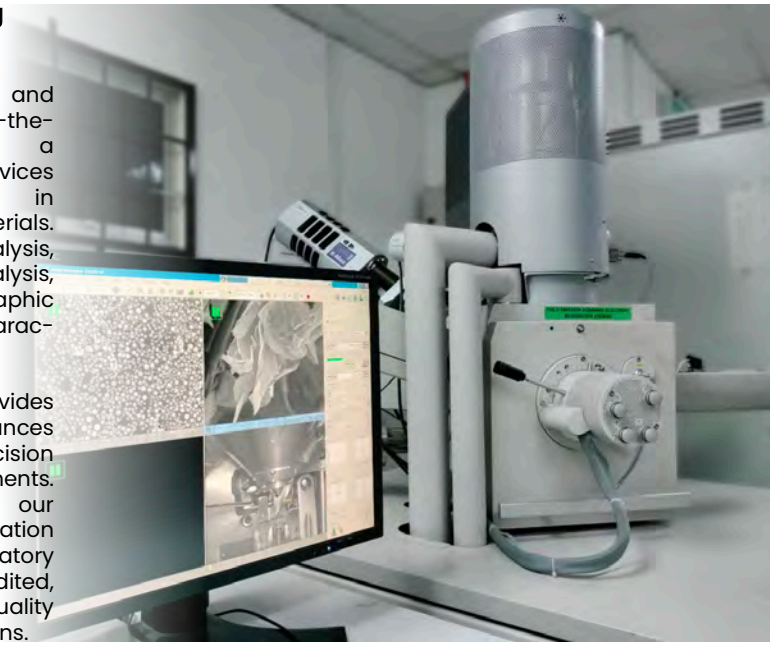
The session was led by Prof. Dr. Chawalit Ngamcharussrivichai, ION2 Adjunct Professor from Chulalongkorn University, Thailand, and Ts. Dr. Umer Rashid, ION2 Research Fellow.

The interactive sessions received positive feedback, showcasing ION2's commitment to global excellence in nanotechnology research.

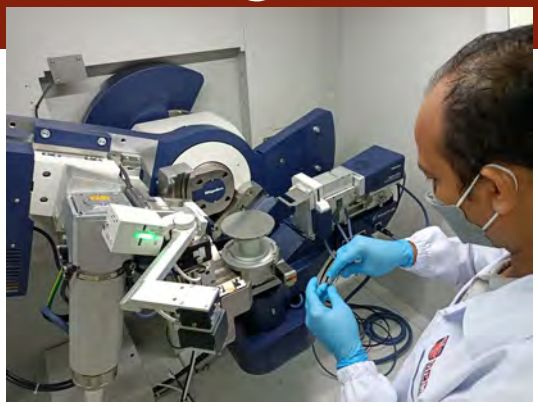

### Cutting-edge Laboratory & Testing Services at ION2

The Institute of Nanoscience and Nanotechnology (ION2) offers state-of-the-art laboratory facilities, and a comprehensive range of testing services tailored to research needs in nanotechnology and advanced materials. Our services include molecular analysis, thermal analysis, particle size analysis, mechanical testing, chromatographic testing, and magnetisation characterisation.

Beyond testing, ION2 also provides calibration services for electronic balances and standard weights, ensuring precision and reliability in scientific measurements. Committed to excellence, two of our laboratories; the Characterisation Laboratory and Mass Metrology Laboratory are MS ISO/IEC 17025 accredited, highlighting our dedication to high-quality standards and trusted research solutions.



# FACILITIES & Testing Services



Scan for more Information:

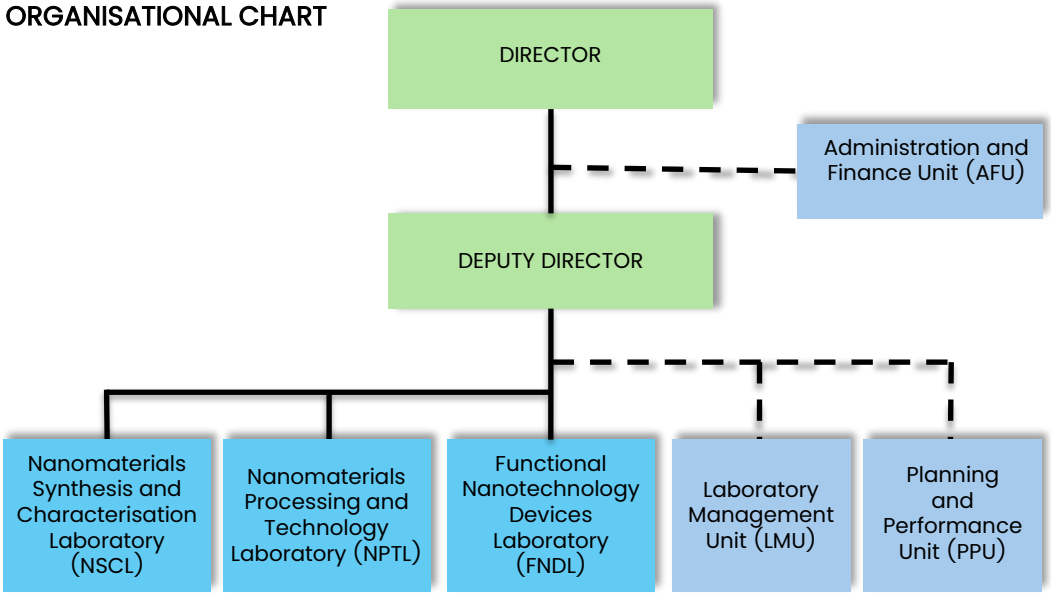
**Contact us:**

Laboratory Management Unit
Institute of Nanoscience and Nanotechnology
Universiti Putra Malaysia
43400 UPM Serdang

Phone: 03-9769 8475 / 7539 / 7566 / 7567
Email: ion2_services@upm.edu.my

# MANAGEMENT & GOVERNANCE

## ORGANISATIONAL CHART




## TOP MANAGEMENT

**Prof. Ir. Ts. Dr. Suraya Abdul Rashid**
Director

**Assoc. Prof. ChM. Dr. Jaafar Abdullah**
Deputy Director

**Assoc. Prof. Dr. Mas Jaffri Masarudin**
Head of NSCL

**Assoc. Prof. Ir. Ts. Dr. Siti Hajar Othman**
Head of NPTL

**Assoc. Prof. Dr. Yap Wing Fen**
Head of FNDL

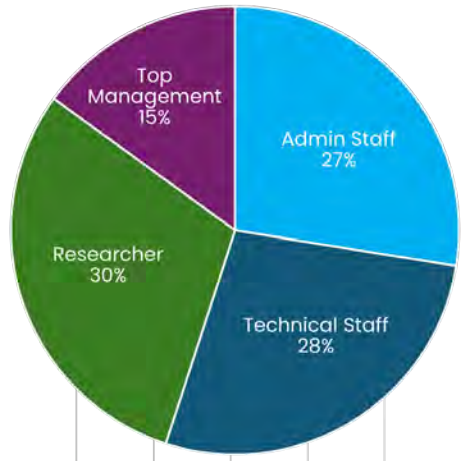
**Rosiha Abdul Razak**
Head of AFU
**Until September 30*

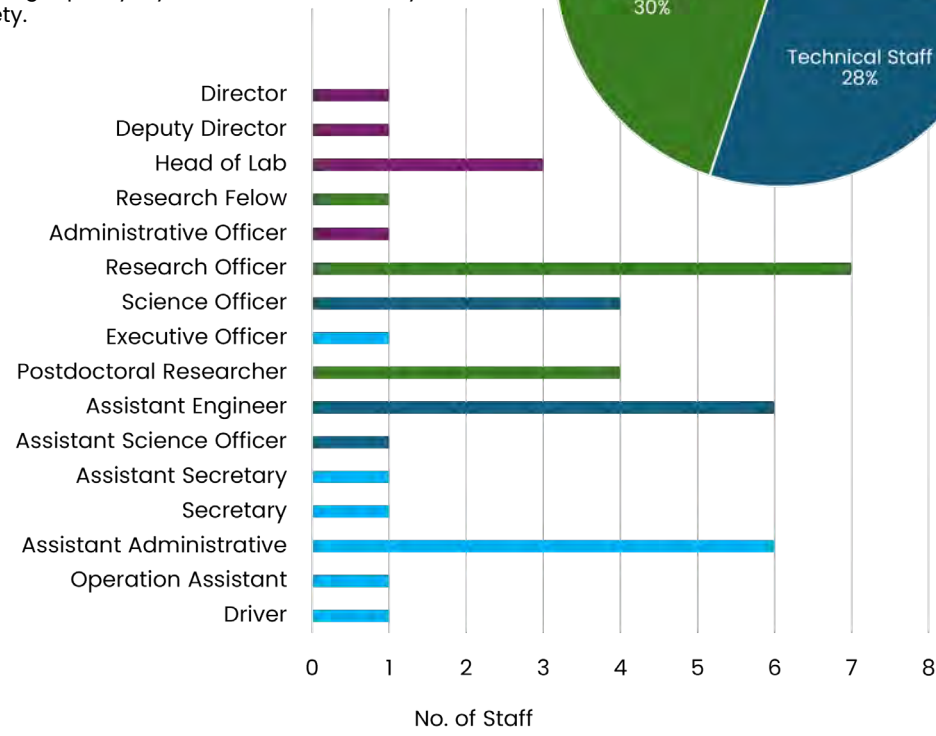
**Wan Nur Syamimie Wan Azman**
Head of AFU
**Effective October 1*

**Md. Ali Rani**
Head of LMU

## HUMAN RESOURCES

ION2 is supported by a team of dedicated staff to facilitate the overall operation of the institute's functions and activities. In addition, several committees are also formed to implement and monitor various activities, including management of research and postgraduates, university-industry-community linkages, research funding, quality systems, and laboratory safety.




## STAFF APPRECIATIONS

### UPM Excellence Service Award 2023 Recipients

ION2 extends its congratulations to the staff who received excellence and loyalty awards during the Majlis Gemilang Putra (MGP) held on May 28. The Excellence Service Award (APC) was presented to staff for outstanding performance in 2023, while the Setia Putra Award recognised those who have served for over 20 years. The list of award recipients is as follows:

**EXCELLENCE SERVICE AWARD**

*Awarded for outstanding performance in 2023*

**Mr. Mohd Ali Mat Nong**
Research Officer

**Mr. Zakky Yamanie Jamiauddin**
Assistant Engineer

**SETIA PUTRA AWARD**

*Awarded to staff with over 20 years of service*


Dr. Ismayadi Ismail
Research Officer


Dr. Siti Zulaika Razali
Research Officer


Mr. Mohd Ali Mat Nong
Research Officer


Ms. Juraina Md Yusof
Research Officer


Ms. Sarinawani Abdul Ghani
Science Officer


Ms. Rosiha Abdul Razak
Senior Registrar Assistant


Mr. Ab. Haffiz Ab Jalil
Assistant Engineer


Ms. Noor Lina Shamsuddin
Assistant Engineer


Mr. Mohd Wafi Azimin
Mohammad Jan
Assistant Engineer


Mr. Norazli Sulaiman
Driver


Dr. Rosnah Nawang
Research Officer

ION2 also congratulates the academic officers and affiliated researchers who received the Vice Chancellor's Fellowship Award in various categories at the same event.

**SPECIAL PUTRA ACADEMIA AWARD**
Prof. ChM. Dr. Mohd. Basyaruddin Abdul Rahman
Faculty of Science

**RESEARCH AND INNOVATION**
Outstanding Researcher – Science and Technology & Innovation & Product Commercialization
Prof. ChM. Dr. Lim Hong Ngee
Faculty of Science

**VICE CHANCELLOR FELLOWSHIP AWARD**
(Category: Student Development)
Assoc. Prof. Dr. Yap Wing Fen
Head of Functional Nanotechnology Devices Laboratory (FNDL)

**RESEARCH AND INNOVATION**
Journal Paper Publication – Science and Technology
Dr. Mohd Hafiz Mohd Zaid
Faculty of Science

Vice Chancellor's Fellowship Award Recipients at Majlis Gemilang Putra 2024

## ADMINISTRATION OFFICE

### Director's Office

**Director**
Prof. Dr. Mohd Nizar Hamidon
(*Until January 31*)
Prof. Ts. Dr. Suraya Abdul Rashid
(*Effective February 1*)

**Secretary**
Khariza Abdul Wahab
(*Until 31st December*)
Siti Hajarul Kasdi
(*Effective 30th December*)

### Deputy Director's Office

**Deputy Director**
Prof. Ir. Ts. Dr. Suraya Abdul Rashid
(*Until January 31*)
Assoc. Prof. Dr. Jaafar Abdullah
(*Effective 15th February*)

**Assistant Secretary**
Aiza Amiera Amir Sharifuddin
(*Effective June 4*)

### Administration and Financial Unit

**Senior Assistant Registrar**
Rosiha Abdul Razak
(*Until September 30*)
Wan Nur Syarmimie Wan Azman
(*Effective October 1*)

**Assistant Engineer**
Ab Haffiz Ab Jalil
*(Development and Facilities)*

**Senior Administrative Assistant**
Zamzurina Abdul Wahab
(*Management & Human Resources*)

Noor Linda Hassan
(*Laboratory Management*)

**Administrative Assistant**
Norliyana Mahat
(*Financial*)

**Operation Assistant**
Muhammad Fikrul Hasani Che Musa

**Driver**
Nor Azli Sulaiman

### Planning and Performance Unit

**Executive Officer 3**
Siti Nur Lidiya Sharudin

**Senior Administrative Assistant**
Rokiah Deraman
(*Postgraduate Management*)

**Administrative Assistant**
Mohd Eri Mohd Noor
(*Research Management*)

Mohamad Yunus Mohamad Syed
(*Financial*)

## LABORATORY MANAGEMENT UNIT

**Science Officer**
Md. Ali Rani
ChM. Sarinawani Abdul Ghani
Roslina Abdul Rashid
Nurnazeera Zulkefli

**Assistant Engineer**
Mohd Kadri Masaud

Noor Lina Shamsuddin

**Assistant Science Officer**
Nurshahida S Saleh

# RESEARCH LABORATORY

## NANOMATERIALS SYNTHESIS CHARACTERISATION LABORATORY

The Nanomaterials Synthesis and Characterisation Laboratory (NSCL) conducts research on the synthesis and characterisation of nanomaterials; exploring how the properties of nanomaterials change with morphological features, reaction conditions and processing parameters.

The research laboratory focuses on the synthesis of nanoscale materials that can be classed into carbon or non-carbon. These materials cover zero-dimensional, one-dimensional, two-dimensional and three-dimensional nanostructures. Carbon-based materials cover carbon and graphene quantum dots, carbon nanotubes, graphene and nanographene derivatives and various hierarchical nanostructures. Non-carbon-based materials cover metals, ceramics, and layered hydroxides, which have various functional properties such as magnetic, dielectric, and superconducting properties.

## RESEARCH PROGRAMMES

### Functional and Structural Nanomaterials

This programme focuses on the synthesis and characterisation of functional materials and advanced structural materials. The study of these materials covers advanced materials such as electronic materials, magnetic materials, dielectric ceramic materials, semiconducting materials, photonic materials, thin film materials and smart materials. It also focuses on composite matrix advanced polymers, metal alloy structures, and ceramic materials.

The focus for magnetic and dielectric ceramics is on microstructure-property evolving relationships. For the other materials, electrical and optical characteristics are studied in depth: fundamental understanding of property behaviour and technological applications are equally important. Of particular importance is the enhancement of materials' properties through the use of nanomaterials in material synthesis. Mechanical alloying, wet-chemistry, electrodeposition and physical and chemical vapour deposition synthesis methods are employed. Targeted technological applications are wide-ranging: electrical, electronic, optical, opto-electronic, etc.

### Nanomaterials and Carbon Nanomaterials

The programme includes basic and applied research towards understanding the nature of material behaviour and their application in technologies. The programme focuses on the science and technology of nanomaterials with research topics including dimensional technology for various applications such as carbon nanotubes, graphene and its derivatives, graphene oxide, graphene quantum dots, and activated carbon.

This research programme also focuses on the fundamentals and use of nanomaterials for various applications, especially for the nanodelivery of active agents for agriculture and medicine, with particular emphasis on drug and theragnostic nanodelivery systems, as well as the synthesis of novel, safe and effective agro nanochemicals. The programme also focuses on nanomaterials in energy, eco-materials and water safety.

### Foundry of Reticular Materials for Sustainability

The Foundry of Reticular Materials for Sustainability (FORM) is a long-term collaborative programme between Universiti Putra Malaysia and the University of California, Berkeley, USA. The programme focuses on research involving the synthesis and application of metal-organic frameworks (MOFs). MOF applications include, but are not limited to materials science and technology, biosystem and biotechnology, agriculture, water, veterinary and animal science, energy, health, and medicine.

The laboratory focuses on the synthesis of MOFs and can be divided into general and post-synthetic modification. The general synthesis method includes studies of MOFs developed from the study of zeolite. Except for the use of preformed ligands, MOFs and zeolites are produced almost exclusively by hydrothermal or solvothermal techniques, where crystals are slowly grown from a hot solution. In contrast with zeolites, MOFs are constructed from bridging organic ligands that remain intact throughout the synthesis. Post-synthetic modification methods cover ligand exchange, metal exchange, stratified synthesis and open coordinate

## LABORATORY MEMBERS

**ASSOC. PROF. DR. MAS JAFRI MASARUDDIN**
Head of Laboratory
PhD (La Trobe University, Australia)
Expertise: Nanobiotechnology, Drug delivery, Anticancer Therapeutics, Microbial-Synthesis of Nanomaterials

**PROF. DR. MEHMET ERTUGRUL**
Adjunct Professor

**ASSOC. PROF. DR. KHAMIRUL AMIN MATORI**
Head of Nanomaterials Programme
Research Associate
BSc (UPM), MSc (UPM), PhD (Sheffield, UK)
Expertise: Materials Science, Materials Engineering, Ceramics

**PROF. DR. CHEN SOO KIEN**
Head of Functional and Structural Programme
Research Associate
BSc (UKM), MSc (UKM), PhD (Cambridge)
Expertise: Superconducting Materials

**DR. JOSEPHINE LIEW YING CHYI**
Head of Foundry of Reticular Materials for Sustainability
Research Associate
BSc (UTM), MSc (UPM), PhD (UPM)
Expertise: Semiconductor Materials Characterisation, Synthesisation, & Utilisation

**TS. DR. MOHD HAFIZUDDIN AB GHANI**
Research Officer
BSc (UKM), MSc (UKM), PhD (UKM)
Expertise: Advanced Polymer, Biocomposite, Nanocomposite

**DR. ROSNAH NAWANG**
Research Officer
BSc (USM), MSc (USM), PhD (UPM)
Expertise: Bioceramics, Bone Regeneration

**MOHD ALI MAT NONG**
Research Officer
BEng (UPM), MSc (UPM)
Expertise: Nanoelectronics, Solar Cell, Nanomaterials

**PROF. ChM DR. ZULKARNAIN ZAINAL**
Research Associate
BSc (Hons) (UKM), PhD (UMIST)
Expertise: Electrochemistry. Material Chemistry

**PROF. ChM DR. MOHD BASYARUDDIN ABDUL RAHMAN**
Research Associate
BSc (UTM), PhD (Southampton)
Expertise: Theoretical and Computational Chemistry, Catalysis, Synthesis, Oleochemistry

**ASSOC. PROF DR. ABDUL HALIM ABDULLAH**
Research Associate
BSc (New Brunswick), PhD (Dundee)
Expertise: Analytical Chemistry, Catalysis, Environmental Chemistry, Materials Chemistry

**ASSOC. PROF. DR. RABA'AH SYAHIDAH AZIS**
Research Associate
BSc (UPM), MSc (UPM), PhD (Warwick, UK)
Expertise: Ceramics, Magnetic Materials, Nuclear Magnetic Resonance

**ASSOC. PROF. DR. SITI AQLIMA AHMAD**
B.Sc (UPM), MSc (UPM), PhD (UPM)
Expertise: Green Nanomaterials, Bioremediation (Toxicology)

**DR. MOHD HAFIZ MOHD ZAID**
Research Associate
B.Sc (UPM), MSc (UPM), PhD (UPM)
Expertise: Material Science, Glass, Ceramic, Composites, Nanomaterials

**DR. NURUL HUDA OSMAN**
Research Associate (until March 2023)
BEng (Surrey, UK), PhD (Surrey, UK)
Expertise: Microwave Planar Components, Material Characterisation, Sensor Design

**DR. MUHAMMAD ALIF MOHAMMAD LATIF**
Research Associate
BSc (UPM), MSc (UPM), PhD (UPM)
Expertise: Computational and Experimental Metal-Organic Framework

**ASSOC. PROF. TS. DR. AMIR SYAHIR AMIR HAMZAH**
Research Associate
PhD (Japan)
Expertise: Biosensors, Protein Interaction, Surface Chemistry

**ASSOC. PROF. DR. MOHAMAD FAIZAL IBRAHIM**
Research Associate
PhD (UPM)
Expertise: Enzyme Technology, Fermentation Technology, Waste Utilisation

**DR. MUHAMMAD SAFWAN ZAINI**
Postdoctoral Researcher
BSc (UPM), MSc (UPM), PhD (UPM)
Expertise:

**NAZRUL ABDULLAH**
Assistant Engineer
Dip. Eng. (Mechanical), BEng (UTM)
Expertise: BET and 3D Modeling Software

**NOOR LINDA HASSAN**
Laboratory Personal Assistant

# RESEARCH LABORATORY

## NANOMATERIALS TECHNOLOGY AND PROCESSING LABORATORY

The Nanomaterials Technology and Processing Laboratory (NPTL) was established to meet research needs in the field of nanomaterial processing and nanotechnology applications. NPTL is developed to complement the ecosystem of institutes that aim to be leaders in the fields of nanoscience and nanotechnology.

NPTL focuses on developing and promoting research in the processing of green nanomaterials, as well as the development of sustainable and innovative products for various applications. NPTL also has expertise related to agri-nanotechnology, which aligns with UPM's main research in agriculture.

Through strategic collaborations with other laboratories in IION2 and UPM, as well as with industries and government agencies, NPTL works to harness research in nanoscience and nanotechnology for national impact.

## RESEARCH PROGRAMMES

### Nanomaterials Processing

The programme focuses on developing research related to scalable and energy-efficient nano processing and materials. We have expertise in the bottom-up synthesis and processing of carbon nanomaterials such as carbon nanotubes (CNTs), CNTs cotton, graphene and graphene homologs by both batch and continuous chemical vapour deposition (CVD) processes.

A scalable top-down process for the preparation of graphene oxide and carbon quantum dots is also in progress. Other processes for advanced materials and nanomaterials include hydrothermal and solvothermal techniques, electrospinning nanofibers, nanoemulsion processing, nanoencapsulation and nanocoating methods. Research under this programme spans from basic research to processing that can be used as a proof of concept.

### Nanomaterials Technology

The programme focuses on the development of sustainable and innovative products using advanced materials and nanomaterials for various applications. The various types of materials and nanomaterials used include biochar and biocatalysts, carbon nanotubes, graphene, homologous graphene, carbon quantum dots, and numerous metal oxide nanoparticles.

The products developed are diverse and include bio-based products such as bio-lubricants, green drilling fluids with nanomaterials, green polymers and nanocomposites for membranes and packaging, green corrosion inhibitors, environmental sensors, renewable agro-chemicals such as green nanoemulsion poisons/ herbicides, various nanofertilizers and novel carbon quantum for photosynthesis enhancement. The types of research under this programme include basic research to application research for proof of concept and performance testing.

## LABORATORY MEMBERS

**ASSOC. PROF. IR. TS. DR. SITI HAJAR OTHMAN**
Head of Laboratory
BEng (Vanderbilt), PhD (UPM)
Expertise: Nanotechnology, Food Packaging Engineering

**PROF. DR. CHAWALIT NGAMCHARUSSRIVICHAI**
Adjunct Professor

**TS. DR. UMER RASHID**
Head of Nanomaterials Processing Programme
BSc (Pakistan), MSc (Pakistan), PhD (Pakistan)
Expertise: Renewable Energy

**ASSOC. PROF. TS. DR. NORKHAIRUNNISA MAZLAN**
Head of Nanotechnology Programme
BEng (USM), MSc (USM), PhD (USM)
Expertise: Polymer Nanocomposite Materials

**DR. SITI ZULAIKA RAZALI**
Research Officer
BEng (UKM), MSc (UPM), PhD (UPM)
Expertise: Biobased Products, Nanotechnology, Drilling Fluids

**JURAINA MD YUSOF**
Research Officer
BEng (USM), MSc (UKM)
Expertise: Carbon Nanomaterials, Carbon Particles, Piezoelectric Materials

**PROF. IR. TS. DR. SURAYA ABDUL RASHID**
Research Associate
BEng (Nottingham, UK), PhD (Imperial College)
Expertise: Nanotechnology and Nanomaterials

**ASSOC. PROF. DR. MOHAMAD AMRAN MOHD SALLEH**
Research Associate
BEng (Western Ontario), PhD (Birmingham)
Expertise: Particle Technology, Biochar and Nanotechnology, Carbonaceous Particulates

**DR. FAIZAH MOHD YASIN**
Research Associate
BEng (TUT), MSc (UPM), PhD (University of Western Australia)
Expertise: Nanotechnology, Advanced Materials

**ASSOC. PROF. DR. ChM NORIZAH ABDUL RAHMAN**
Research Associate
BSc (UTM), MSc (UTM), PhD (Auckland)
Expertise: Conducting Polymers and Electrospun Polymer Nanofiber

**DR. DAYANG RADIAH AWANG BIAK**
Research Associate
BEng (CWRU), PhD (Birmingham)
Expertise: Heat Transfer, Modelling, Food Processing, Crystallisation, Pharmaceutical

**DR. SHAFREEZA SOBRI**
Research Associate
BEng (UTM), PhD (Newcastle)
Expertise: Electrocrystallisation and Electrochemical Engineering

**DR. NORDIN BIN SABLI**
Research Associate
BEng (TUT), MEng (UPM), PhD (UPM)
Expertise: Photoelectrochemical Cell, Fuel Cell

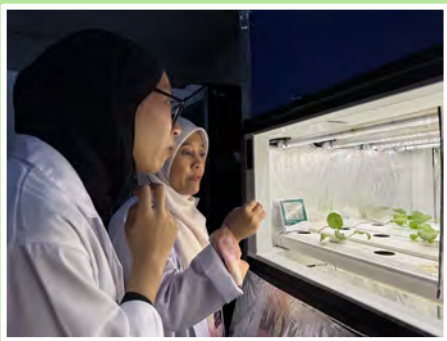
**DR. TAN SIN TEE**
Research Associate
BSc (UKM), PhD (UKM)
Expertise: Nanomaterials, Solar Cells, Photo(electro)catalysis, Optical Gas Sensor

**ASSOC. PROF. IR. DR. MOHD NAZLI NAIM**
Research Associate
BEng (UKM), PhD (Japan)
Expertise: Bionanotechnology, Food and biomaterial coating, Nanotechnology-enhanced water treatment

**DR. NUR SYAKINA JAMALI**
Research Associate
BEng (UNIMAS), PhD (UKM)
Expertise: Biogas & Renewable Energy, Biohydrogen Production, Bioconversion of Biomass, Immobilization & Biofilm Formation

**ZAKKY YAMANIE JAMIAUDDIN**
Assistant Engineer
Certificate of Engineering (Politeknik TSM Kulim)
Expertise: Mechanical Engineering

**NOOR LINDA HASSAN**
Laboratory Personal Assistant



*"When ideas are shared, knowledge expands; research culture flourishes where collaboration is valued." — ION2*

# RESEARCH LABORATORY

## FUNCTIONAL NANOTECHNOLOGY DEVICES LABORATORY

The Functional Nanotechnology Devices Laboratory (FNDL) aims to be a leader in sensor technology and electron devices for nanotechnology and advanced materials. FNDL conducts innovative research related to advanced nanomaterials, such as carbon-based nanomaterials in the areas of sensors, electron devices as well as energy.

This laboratory aims to provide affordable, enabling green, and sustainable technology in advanced sensor technologies, advanced RF technologies, electronic nanomaterials and devices, and renewable energy. Research works also focus on nanoscale green synthesis and its application as the new niche area of the institute while promoting 17 Sustainable Development Goals (SDGs) and the 10-10 MySTIE framework.

We coordinate these technologies within FNDL and other laboratories in ION2, with other services agencies, industry, and academia, to leverage basic and applied research opportunities for the benefit of the nation.

## RESEARCH PROGRAMMES

### Sensor Technology

The focus of this programme includes the study and preparation of sensors based on nanomaterials and characterised by related transducers, signal processing and system or device design in the development of sensors to meet the demands of society (Society 5.0) and industry (IR5.0), which will include the well-being of society through green technology. Sensor systems include (but are not limited to) electronic sensors, biosensors, and chemical sensors.

Sensor technology has a very important role as a key technology to support various research and industrial applications. It is also an important element that can be used for water security, agriculture, environment, sustainable and green technology.

### Electron Devices

Electron Devices is a programme that aims to carry out applied research in the growth of semiconductors and related nanomaterials, as well as analysis with the aim of developing new and improved electronic devices.

The vision in this field is the next generation of electronic devices and solar cells for better performance and reliability in complex environments to meet the demands of society (Society 5.0) and industry (IR 5.0), which will include the well-being of society through green technology. Research areas include nanoelectronics, RF energy harvesting and usable energy for energy security, agriculture, environment, sustainable and green technology.

## LABORATORY MEMBERS

**ASSOC. PROF. DR. YAP WING FEN**
Head of Laboratory
BSc (UPM), PhD (UPM)
Expertise: Optical Sensor Based on Surface Plasmon Resonance Technique, Optical Studies on Glass Ceramics Composite Materials, Optical Properties of Nanocomposite Thin Film, Physics Literacy, Simulation & Multimedia

**PROF. DR. LEE YOOK HENG**
Adjunct Professor

**PROF. IR. TS. DR. SUHAIDI SHAFIE**
Head of Nano Energy Devices/ Research Associate
BEng (Japan), MSc (Japan), DEng (Nanovision) (Japan)
Expertise: CMOS Image Sensor, Porous Silicon, Solar Cell, VLSI Design, Analog TV/VCR Tuners

**TS. DR. INTAN HELINA HASAN**
Research Officer
BSc (Yokohama), MSc (UPM), PhD (UPM)
Expertise: Electron Devices, Thick Film Technology, Printed Electronics

**DR. ISMAYADI ISMAIL**
Research Officer
BSc (UKM), MSc (UPM), PhD (UPM)
Expertise: Magnetic Materials, EM-wave Absorbing Materials, Carbon-based Nanomaterials

**ASSOC. PROF. ChM DR. JAAFAR ABDULLAH**
Research Associate
BSc (UKM), PhD (UKM)
Expertise: Analytical Chemistry

**PROF. DR. MOHD NIZAR HAMIDON**
Research Associate
BSc (UM), MSc (UKM), PhD (Southampton), MIEEE
Expertise: Electron Devices, Wireless System, Nanotechnology, Sensor Technology

**PROF. ChM DR. NOR AZAH YUSOF**
Research Associate
BSc (UKM), PhD (UKM)
Expertise: Chemical Analysis, Electrochemistry, Environmental Chemistry

**PROF. ChM DR. LIM HONG NGEE**
Research Associate
BSc (UKM), MSc (UKM), PhD (UPM)
Expertise: Analytical Chemistry, Materials Chemistry

**ASSOC. PROF. ChM DR. YUSRAN SULAIMAN**
Research Associate
BSc (UTM), MSC (UTM), PhD (Durham)
Expertise: Analytical Chemistry, Electrochemistry, Materials Chemistry

**PROF. DR. NORHISAM MISRON**
Research Associate
BEng (Shinshu), MSc (Shinshu), PhD (Shinshu), MIEEE, MIEM, IEEJ
Expertise: Electrical Machine, Power Electronic Drive, Magnetic Sensor

**ASSOC. PROF. TS. DR. SURIATI PAIMAN**
Research Associate
BSc (UTM), MSc (UTM), PhD (ANU, Australia)
Expertise: Crystal Growth, Semiconductors Nanostructured Materials, Nanomaterials, Thin Film, Optoelectronics Applications

**ASSOC. PROF. DR. SHARUL AINLIAH ALANG AHMAD**
Research Associate
BSc (UPM), PhD (Sheffield)
Expertise: Analytical Chemistry

**TS. DR. MOHD NAZIM MOKHTAR**
Research Associate
BEng (Surrey), PhD (Surrey)
Expertise: Biomedical Nanoelectronics Engineering, Lab on Chip, Energy Harvesting

**TS. DR. HASLINA JAAFAR**
Research Associate
BEng (UKM), MSc (UKM), PhD (USM) MIEEE, BEM
Expertise: Flexible Sensors & Electronics, Micro-electromechanical System (MEMS), Carbon Nanomaterials and Embedded System

**DR. AMRALLAH MUSTAFA**
Research Associate
BEng (UPM), MSc (UPM), PhD (Eng)(Shizuoka, Japan)
Expertise: Solar Cell, CMOS Image Sensors, Analog IC Design, Robotics

**ASSOC. PROF. IR. DR. NORHAFIZ AZIS**
Research Associate
BEng (UPM), PhD (Manchester), MIEEE
Expertise: Transformer Condition Monitoring, Insulation Ageing, and Diagnostics, Asset Management and Alternative Insulation Materials for High Voltage Power Equipment

**PROF. DR. MOHD. ADZIR B. MAHDI**
BEng. (EE) (UKM), M.Sc. (UM), Ph.D. (UM)
Expertise: Photonic Devices, Optical Comm.

**DR. FATIN NABILAH MOHD FAUDZI**
Postdoctoral Researcher
BSc (UTM), PhD (UniMAP)
Expertise: Biosensor, Carbon Nanomaterials

**DR. NUR HAWA NABILAH AZMAN**
Postdoctoral Researcher
BSc (UPM), PhD (UPM)
Expertise: Materials Science

**DR. NORITA MOHD YUSOFF**
Postdoctoral Researcher
BSc (UPM), MSc (UPM), PhD (UPM)
Area of expertise: Material science, ultrafast photonics, micro and nanomaterials synthesis, nonlinear optics, device fabrications

**MOHD WAFI AZIMIN MOHAMMAD JAN**
Assistant Engineer
Certificate of Electronic Engineering
Expertise: Inkjet Printing

**NOOR LINDA HASSAN**
Laboratory Personal Assistant

# LISTS OF COMMITTEES

## RESEARCH AND INNOVATION COMMITTEE

**Chairman**
Prof. Ir. Ts. Dr. Suraya Abdul Rashid

**Deputy Chairman**
Ts. Dr. Intan Helina Hasan

**Secretary**
Siti Nur Lidiya Sharudin

**Committee Members**
Dr. Ismayadi Ismail
Dr. Siti Zulaika Razali
Ts. Dr. Mohd Hafizuddin Ab Ghani
Dr. Rosnah Nawang
Juraina Md Yusof
Mohd Ali Mat Nong
Mohd Eri Nohd Noor

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Siti Nur Lidiya Sharudin

**Committee Members**
Ts. Dr. Intan Helina Hasan
Dr. Ismayadi Ismail
Dr. Rosnah Nawang
Dr. Siti Zulaika Razali
Mohd Ali Mat Nong
Juraina Md Yusof
Rokiah Deraman

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Ts. Dr. Intan Helina Hasan
Ts. Dr. Mohd Hafizuddin Ab Ghani
Dr. Siti Zulaika Razali
Md. Ali Rani
Mohd Ali Mat Nong
Noor Linda Hassan

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**Deputy Chairman**
Rosiha Abdul Razak (*Until September 30*)
Wan Nur Syarmimie Wan Azman (*Effective October 1*)

**Secretary**
Aiza Amiera Amir Sharifuddin

**Committee Members**
Nazrul Abdullah
Mohd Kadri Masaud
Ab Haffiz Ab Jalil
Mohd Wafi Azimin Muhamad Jan
Zakky Yamanie Jamiauddin
Noor Lina Shamsuddin
Nurshahida S. Saleh
Norliyana Mahat
Mohamad Yunus bin Mohamad Syed

## TECHNICAL AND QUOTATION MEETING COMMITTEE

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**Secretary**
Rosiha Abdul Razak (*Until September 30*)
Wan Nur Syarmimie Wan Azman (*Effective October 1*)

**Committee Members**
Assoc. Prof. ChM Dr. Jaafar Abdullah
Assoc. Prof. Ir. Dr. Siti Hajar Othman
Assoc. Prof. Dr. Mas Jaffri Masarudin
Assoc. Prof. Dr. Yap Wing Fen
ChM Sarinawani Abdul Ghani

## QMS MS 9001 COMMITTEE

**Deputy Management Representative**
Rosiha Abdul Razak (*Until September 30*)
Wan Nur Syarmimie Wan Azman
(*Effective October 1*)

**Deputy Document Control Officer**
Mohd Ali Mat Nong

**Deputy Customer's Satisfaction Coordinator**
Siti Nur Lidiya Sharudin

**Deputy Internal Audit Coordinator**
Dr. Rosnah Nawang

**Internal Auditors**
Md. Ali Rani
Roslina Abdul Rashid
Rokiah Deraman
Mohd. Wafi Azimin Mohammad Jan
Nazrul Abdullah
Juraina Md Yusof
Mohamad Yunus Mohamad Syed

**Secretary**
Zamzurina Abdul Wahab

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Siti Nur Lidiya Sharudin (EKSA)
Noor Lina Shamsuddin (OSHA)
Rokiah Deraman (Postgraduate)
Norliyana Mahat (Finance)
Mohd Eri Mohd Noor (Research)
Khariza Abdul Wahab (Office record)

## QUALITY MANAGEMENT SYSTEM - MS ISO/IEC 17025 COMMITTEE

**Quality Manager**
ChM Sarinawani Abdul Ghanl

**Deputy Quality Manager**
Roslina Abdul Rashid

**Technical Manager**
Dr. Ismayadi Ismail
(*Characterization Laboratory*)
Nurnazeera Zulkefli
(*Mass Metrology Laboratory*)

**Deputy Technical Manager**
Md. Ali Rani
(*Characterization Laboratory*)
Noor Lina Shamsuddin
(*Mass Metrology Laboratory*)

**Document Control Officer**
Mohd Ali Mat Nong

**Technical Staff/Competent Personnel**
Md Ali Rani
ChM Sarinawani Abdul Ghani
Nurnazeera Zulkefli
Nazrul Abdullah
Noor Lina Shamsuddin
Zakky Yamanie Jamiauddin
Mohd Kadri Masaud
Mohd Wafi Azimin Mohammad Jan

## RISK MANAGEMENT COMMITTEE

**Chairman**
Rosiha Abdul Razak (*Until September 30*)
Wan Nur Syarmimie Wan Azman
(*Effective October 1*)

**Secretary**
Mohd Ali Mat Nong

**Committee Members**
Ts. Dr. Intan Helina Hasan
Dr. Ismayadi Ismail
Dr. Siti Zulaika Razali
Dr. Rosnah Nawang
Nurnazeera Zulkefli
Siti Nur Lidiya Sharudin
Ab Haffiz Ab Jalil

## EQUIPMENT MAINTENANCE AND CALIBRATION COMMITTEE

**Chairman**
Dr. Ismayadi Ismail

**Deputy Chairman**
Roslina Abdul Rashid

**Secretary**
Noor Lina Shamsuddin

**Committee Members**
Md. Ali Rani
ChM Sarinawani Abdul Ghani
Nurnazeera Zulkefli
Nazrul Abdullah
Ab Haffiz Ab Jalil
Mohd Wafi Azimln Mohammad Jan
Mohd Kadri Masaud
Zakky Yamanie Jamiauddin
Nurshahida S Saleh

## OCCUPATIONAL SAFETY AND HEALTH (OSH) COMMITTEE

**Chairman**
Assoc. Prof. Dr. Mas Jaffri Masarudin

**Deputy Chairman**
Md. Ali Rani

**Secretary**
Noor Lina Shamsuddin (*Until August 1*)
Nurshahida S Saleh (*Effective August 1*)

**Employer Representatives**
ChM Sarinawani Abdul Ghani
Roslina Abdul Rashid
Nurnazeera Zulkefli
Nazrul Abdullah
Siti Nur Lidiya Sharudin
Wan Nur Syarmimie Wan Azman
(*Effective October 1*)

**Employee Representative**
Ab Haffiz Ab Jalil
Mohd Wafi Azimin Mohammad Jan
Mohd Kadri Masaud
Zakky Yamanie Jamiauddin
Noor Lina Shamsuddin
Zamzurina Abdul Wahab

**Chemical Waste and E-Waste Coordinator**
Nurshahida S Saleh

**Radiation Worker**
ChM Sarinawani Abdul Ghani
Mohd Kadri Masaud
Ab Haffiz Ab Jalil

## EMERGENCY RESPONSE TEAM (ERT)

**Commandant**
Assoc. Prof. Dr. Mas Jaffri Masarudin

**Deputy Commandant**
Md. Ali Rani

**Liaison Officer**
Nurshahida S Saleh

**Planning**
Roslina Abdul Rashid

**Head of ERT Operation**
Ab Haffiz Ab Jalil

**Logistic**
ChM Sarinawani Abdul Ghani

**Finance**
Noor Lina Shamsuddin

**First Aider**
Zamzurina Abdul Wahab
Muhammad Fikrul Hasani Che Musa

**Fire Fighting Officer**
Mohd Kadri Masaud

**Evacuation Team**
Mohd Wafi Azimin Mohammad Jan
Nazrul Abdullah
Zakky Yamanie Jamiauddin
Nurnazeera Zulkefli
Noor Linda Hassan

**Traffic Control**
Nor Azli Sulaiman

## PUBLICATION COMMITTEE

**Chairman**
Dr. Siti Zulaika Razali

**Secretary**
Siti Nur Lidiya Sharudin

**Committee Members**
Ts. Dr. Intan Helina Hassan
Dr. Ismayadi Ismail
Ts. Dr. Mohd Hafizudin Ab Ghani
Dr. Rosnah Nawang
Roslina Abdul Rashid
Mohd Ali Mat Nong
Juraina Md Yusof
Md. Ali Rani
Nurnazeera Zulkefli
ChM Sarinawani Abdul Ghani

## WEBSITE COMMITTEE

**Chairman**
Assoc. Prof. Ir. Ts. Dr. Siti Hajar Othman

**Deputy Chairman**
Roslina Abdul Rashid

**Secretary**
Rokiah Deraman

**Committee Members**
Ts. Dr. Intan Helina Hasan
Dr. Siti Zulaika Razali
Ts. Dr. Mohd Hafizudin Ab Ghani
Dr. Rosnah Nawang
Juraina Md Yusof
Nurnazeera Zulkefli
Khariza Abdul Wahab
Noor Linda Hassan

## KELESTARIAN HIJAU COMMITTEE

**Chairman**
Rosiha Abdul Razak (*Until September 30*)
Wan Nur Syarmimie Wan Azman
(*Effective October 1*)

**Deputy Chairman**
Ab Haffiz Ab Jalil

**Secretary**
Khariza Abdul Wahab

**Committee Members**
Ts. Dr. Mohd Hafizudin Ab Ghani
Juraina Md Yusof
Mohd Kadri Masaud
Mohd Eri Mohd Noor
Rokiah Deraman
Mohamad Yunus Mohamad Syed
Norliyana Mahat
Aiza Amiera Amir Sharifuddin
Norazli Sulaiman
Muhammad Fikrul Hasani Che Musa

## PUBLIC SECTOR CONDUCIVE ECOSYSTEM COMMITTEE (EKSA)

**Advisor**
Prof. Ir. Ts. Dr. Suraya Abdul Rashid

**Chairman**
Rosiha Abdul Razak (*Until September 30*)
Wan Nur Syarmimie Wan Azman
(*Effective October 1*)

**Secretary**
Khariza Abdul Wahab

**Coordinator**
Siti Nur Lidiya Sharudin

**Facilitator**
Nurainakmal Kamal Bahrin (*Pusat Pertanian Putra*)

**Head of Promotion Committee**
Roslina Abdul Rashid

**Head of Audit Committee**
ChM Sarinawani Abdul Ghani

**Head of Training Committee**
Zamzurina Abdul Wahab

**Head of Zone**
Zakky Yamanie Jamiauddin (*Graphene Zone*)
Mohd Wafi Azimin Mohamad Jan (*Graphite Zone*)
Noor Linda Hassan (*Biochar Zone*)
Nazrul Abdullah (*CNT Zone*)

# PICTORIAL

A visual roundup of the year's most memorable moments not featured elsewhere in previous sections.

## Award Recipients

Honouring outstanding individuals in celebration of the ION2 Jubilee.



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Institut
Nanosains dan
Nanoteknologi
1999 - 2024
Manis Manis
by Sis Ella
012 638 0182
WE ♥ UPM

***Majlis Kesyukuran*** – July 23, 2024


**Internal Audit of MS ISO/IEC 17025** – May 13 & 14, 2024

**Internal Audit of MS ISO 9001**– June 10 & 11, 2024


**ION2 Hari Raya Celebration –** May 7, 2024


**Farewell for Prof. Dr. Mohd Nizar (Former Director)–** February 23, 2024


**Visit by IIUM & Universitas Brahwijaya Students–** May 31, 2024


**Visit from Szabist University, Pakistan** – February 5, 2024


**Preliminary Visit to UPM and ION2 by Dato' Dr. Mahmood Merican Osman Merican and Datin Ragayah Mohamed Eusoff** – October 4, 2024

**Visit to Jabatan Pendidikan Negeri Sembilan (JPNS)** – December 14, 2024


Staff Birthday Celebration

For more information, visit us at

**https://ion2.upm.edu.my**


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